Nature and Energy Resources

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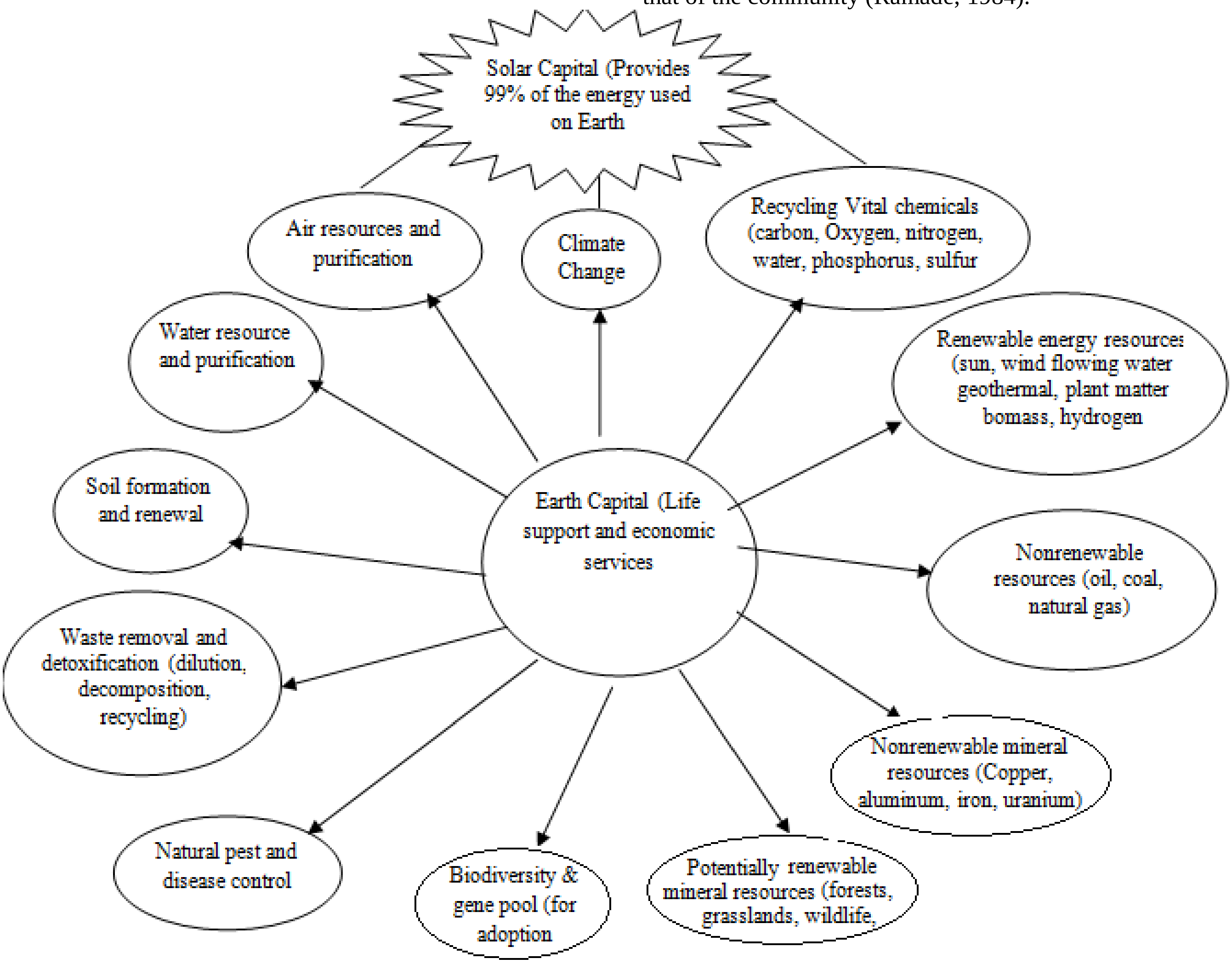
Abstract: ***A resource is anything we get from the environment (Earth's life-support systems) to meet our needs and desires, which has dependability through time. All forms of life need resource such as food, water and shelter for survival, and good health. The earth capital consists of a number of life support system for use by human beings and other species.***

Keywords: Resource, environment, earth, health

1. Introduction

The sum of all physical, chemical, biological and social factors which compose the surrounding of man is referred to as environment and each element of these surroundings constitutes a resource from which man draws in order to develop a better life. Thus, any part of our natural environment-such as land, water, air, minerals, forests, range land, wild life, fish, or even human population –that man can utilize to promote his welfare, are regarded as natural resources.

With reference to energy a resources can be defined as a form of energy and/or matter which is essential for the functioning of organisms, populations, and ecosystems. In the particular case of humans, a resource is any form energy or matter essential for the fulfillment of physiological, socio-economic, and cultural needs, both at the individual level that of the community (Ramade, 1984).



Life support systems and Economic services

The five basic ecological variables-energy, matter, space, time, and diversity are sometimes combine called natural resources. As such, laws which govern changes in these quant ties have great applicability in the resource use.

Resources are dynamic which not only improves new knowledge, expanding science and new technologies but also changing culture and social objectives Fig.2.2.

For example some resources, such as solar energy, fresh air, fresh surface water, fertile soil, and wild edible plants, are directly available for use by us and other organisms, while other resources, such as petroleum (oil), iron, ground water (water occurring underground), and modern crops, are not directly available, and their supplies are limited. They become useful to us only with some effort and technological ingenuity Fig.2.3. For example, petroleum was a mysterious fluid until we learned how to extract it, and refine it into gasoline, and other products that could be used for the support of mankind.

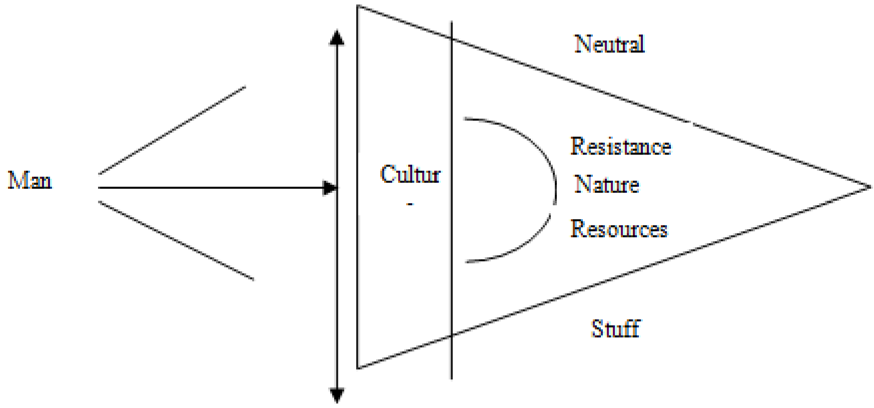
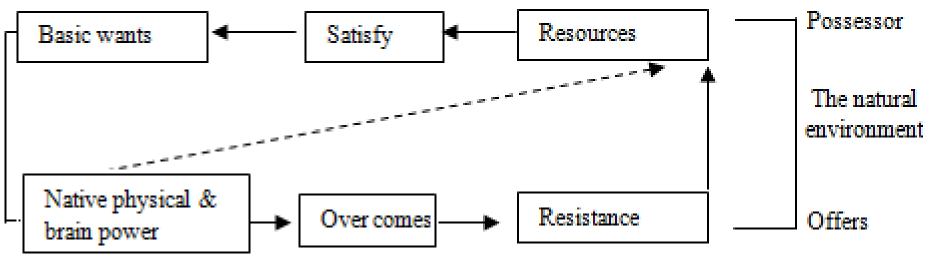


Figure 2.2: The idea of showing culture as a spreadsheet which man drives deeper into the realm of nature, converting more and more neutral stuff into resources – and into resistances as well.

Resources Appraisal

hus resources are any material which is needed or used to sustain life and livelihood. Air to breathe; water to drink; land to live, food for growth, forests for timber, paper, and wood products; ores for iron, aluminum, copper, and other metals; oil, natural gas and coal for energy arte all examples. In short, there is nothing people cannot use which will not involve utilization of our natural resources, Further, the human population is making ever- increasing demands upon, the Earth's ecological resources.



It is directed in simple diagram the more complex relationships accounting for the resources of man on more advance levels of civilization.

World population growth is presently about 2 percent per year has to increase the demand for resources by at least 2 percent per year just to maintain the standard of living. The increase in demand for resources may be multiplied several fold. Further, even in the unlikely event that population growth were checked, increasing demand for resources due to desires for a higher standard of living would probably go on indefinitely.

The Resource Problem

The all-too-obvious question is how long can Earth's resources sustain this growing demand? As per the expert who proposed the Limits to growth, published in 1072, if present trends continue, we will not only run out of resources but will do so with extreme suddenness in the next 30 to 50. Thus, our entire industrial society would collapse in the relatively near future, starved, as it were, for critical resources.

However some experts object the above theory as limits to growth do not give adequate credit to the potential of technology as much as it gives to the resource required fir new technologies. For example, the invention in Organic Chemistry, of synthetic fibers, synthetic rubber, and countless plastic products, can be produced from inexpensive oil resource which relives the pressure on natural fibers and rubber and other more expensive materials. Other advances in technology have permitted the exploitation of lower-grade ores, and so on.

However technology cannot bring back an extinct animal resources but it can extend the supply of some resources by improving them, using them more efficiently or recycling them. For example, due to improved technology, steel provides 43% more structural support that it did few decades back , 7 times more electrical power is generated from I ton of coal than it did few decades back, 7 times more electrical power is generated from 1 ton of local than in 1900. Similarly the energy needed to produce 1 ton of pig iron has fallen eight fold in US since 1800 to 1900, only 10% of the copper was recycled. Today about 40% is recycled. However, while many matter resources, such as copper, lead and silver, can be recycled, we never recycle energy resources. Once a fossil fuel resource, such as coal, oil or natural gas, is burned, it is gone forever as a useful energy source. The concentrated energy in the fossil fuel is released as heat, which is eventually dispersed into the earth's atmosphere. From there it floes back into space. Sometimes technology can solve the problem of a scarce resource by finding a substitute or replacement. For instance, aluminum and reinforced plastics are replacing steel and wood as an energy source, oil replaced coal for many uses nuclear power (obtained from uranium) or a combination of solar, wind and plant (biomass) energy may soon replace petroleum and natural gas.

Any material will be useful as a resource only if it can be made available at a reasonable cost for example, once the easily available supplies of a resource are depleted the costs of finding and making a scarce resource available rise, the resource will eventually become too expensive for most people. Higher costs may stimulate a new search for new supplies or make mining and processing lower grade deposits economically feasible. But regardless of whatever we afford to pay, we can't get a resource out of earth if it is in fact not there.

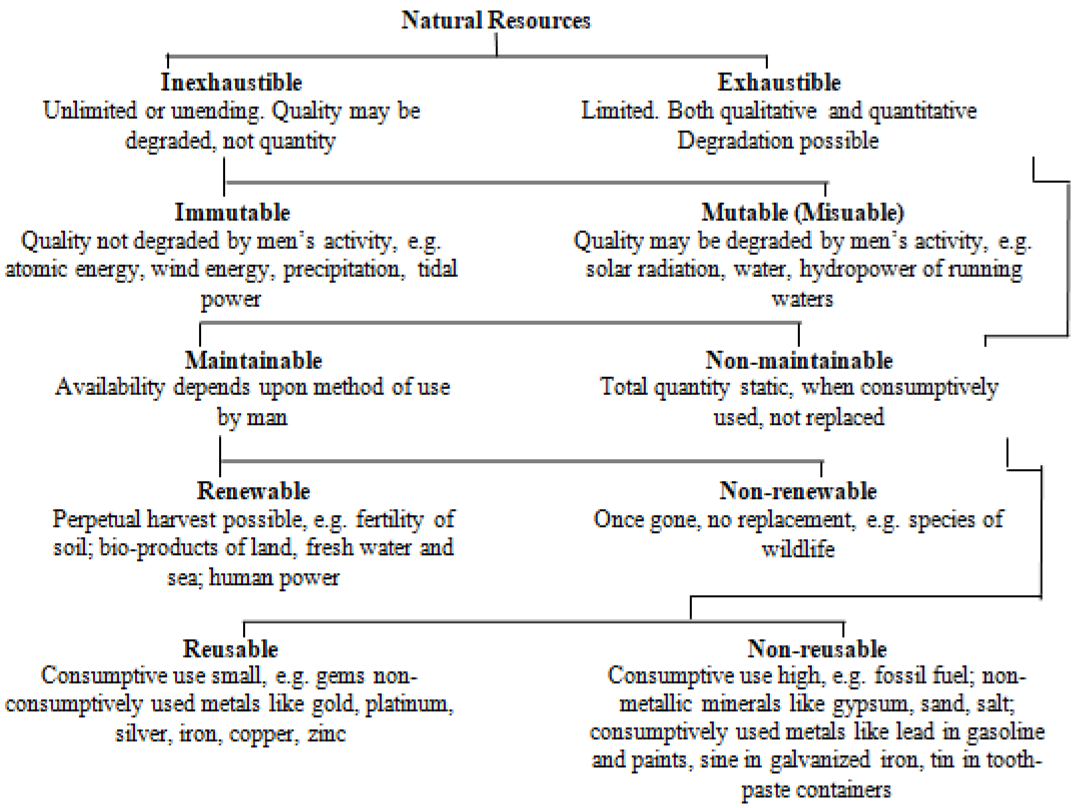
There can also be an economic limit to recycling. Typically, recycling is cheaper than mining virgin materials, but only if the material to be recycled is not too widely dispersed. The continued use of a resource may also depend on the impact of its mining, processing and use on the environment. Even if affordable supplies of a resource area available, its use (at least for certain purposes) may have to be abandoned if this use seriously threatens human and other forms of life. Sometimes the environmental effects of a resource use can be minimized and cleaned up but in some cases the costs may be so high that we can no longer afford to use the resource.

Classes of Resources

Resources are also classified as biotic (or living) and a biotic (or non-living) resources, forest, agriculture, fish and wildlife falling in the first category, and land, water minerals etc, in the second.

Classification of resources based on quantity, mutability and reusability was proposed. Inexhaustible and exhaustible are the main categories of resource based on their stocks in nature (Fig. 2.4). Inexhaustible resources are further divided into two groups-immutable and mutable resources, depending upon the possibility of their qualitative degradation as a result of man's activity. On the other hand, exhaustible resources, being limited in occurrence, are vulnerable to both quantitative and qualitative degradation. Thus, their availability depends upon the method of use, so these care classed into maintainable and non-maintainable resources. Supply of maintainable resources could be made to last for long through wise use however, some of them have capacity to reproduce - called non- renewable resources. Non-maintainable resources have static supply and when destroyed or consumptively used are irreplaceable, yet some of them have potentiality for reuse-called reusable resources, and rest whose permanent exhaustion is certain are called non- reusable resources.

It is convenient to divide resources into three general categories: 1. Renewable resources, 2. Non- renewable resources that can be recycled, and 3. Non-renewable resources that cannot be cycled.



Classification of natural resources

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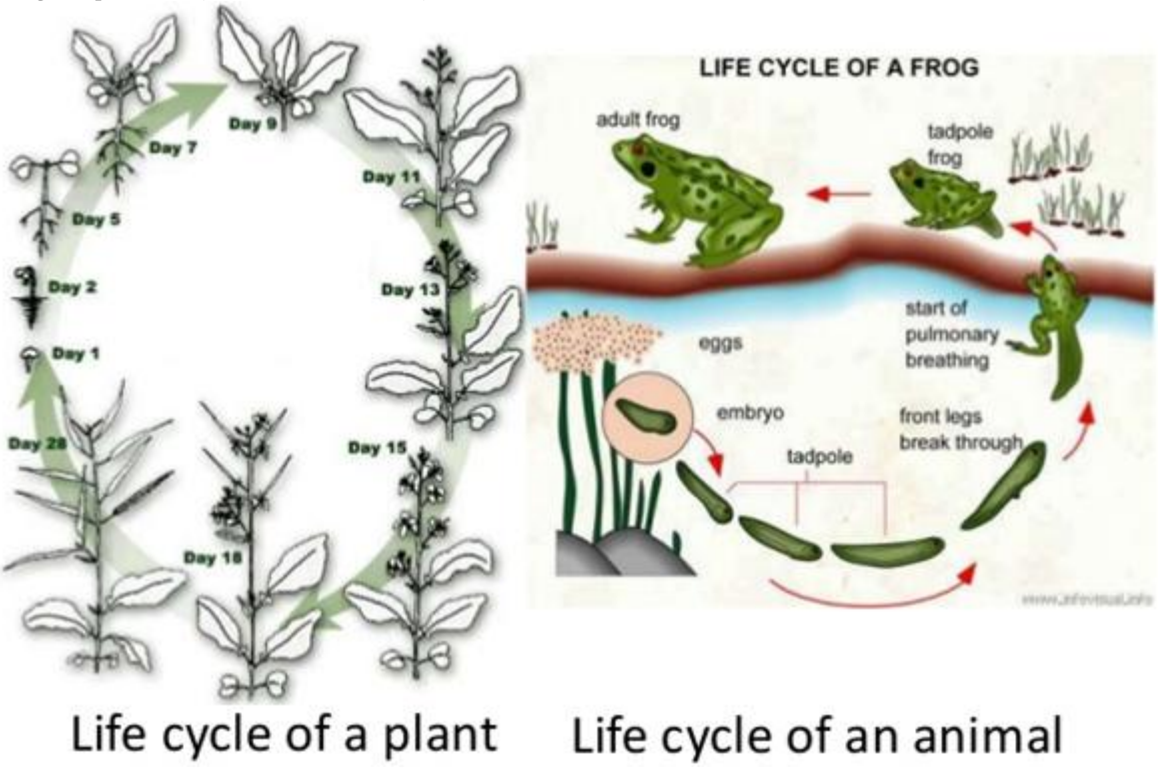
Renewable Resources (Flow)

Renewable resources are those that are replenished through relatively rapid natural cycles Fig.2.5. Examples are oxygen in the air, which is replenished through photosynthesis, freshwater, which is replenished through the water cycle; and all biological products (food, fibers, timber,) which are replenished through natural cycles of growth and reproduction.

Renewable resources are those that are replenished through Natural Cycles



Natural cycles of renewable resources

Solar energy is also called a renewable resource because on a human time scale it is essentially inexhaustible. It is expected to last least 6.5 billion years while the sun completes its life cycle.

Some potentially renewable resource that can renewed fairly rapidly (hours to several decades) through natural processes, include forests, grassland grasses, wild animals, fresh air, and fertile soil.

One important potentially renewable resource for us and other species is biological diversity, or biodiversity, which consists of the life forms that can best survive the variety of conditions currently found on earth. Kinds of biodiversity include 1. Genetic diversity (variety in the genetic makeup among individuals within a single species) 2. Species diversity (Variety among the species or unique forms of life found in different habitats of the planet, and 3. Ecological diversity (variety of forests, deserts, grasslands, streams, lakes, oceans, wetlands, and other biological communities of matter and energy). This rich variety of genes, species, and biological communities gives us food, wood, fibers, energy, raw material, industrial chemicals, and medicines. Various life forms and biological communities also provide free recycling and purification services and natural pest control potential.

Potentially renewable resources however can be depleted. The highest rate at which a potentially renewable resource can be used indefinitely without reducing its available supply is called its sustainable yield. If resource's utilization rate exceeds the natural replacement rate. The available supply begins to shrink, a process known as environmental degradation.

Overuse of Commons

Renewable Resources

One cause of environmental degradation is the overuse of common-property resourced, which are owned by none and available to all users free of charge. Most are potentially renewable. The term global commons refers to portions of Earth and its surrounding space that lie beyond the territorial claims of any nation. Example include clean air, the open ocean, fish in the open ocean, migratory birds, Antarctica, gases of the lower atmosphere, the ozone content of the stratosphere, and space, including the vast high seas, as much as 70% of Earth's surface are commons.

Nonrenewable Resources that can be Recycled

All non-energy mineral resources which occur in the Earth's crust like ores of copper, aluminum, mercury, and other metals; deposits of fertilizer nutrients such as phosphate rock and potassium; and minerals that are used in their natural state such as asbestos, clay, and mica are considered as non renewable resources which can be recycled. As these deposits are mined, they are not replaced, and hence such materials are considered nonrenewable. However, it is possible, at least in theory, for people to collect these materials or elements they used and recycle them.

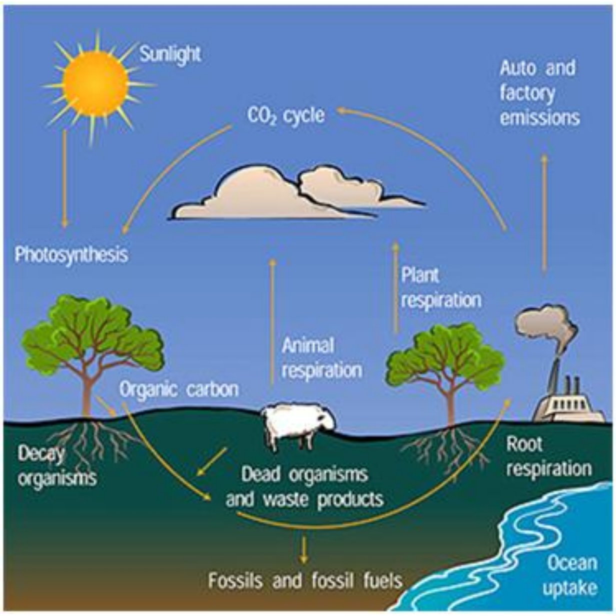
Recycling involves collecting and reprocessing a resource into new products. For example, glass bottles can be crushed and melted to make new bottles or other glass iteams. Reuse involves using a resource over and over in the same form.

In practice, we never completely exhaust a nonrenewable mineral resource. However, a mineral resources becomes economically depleted when the costs of finding, extracting, transporting, and processing what is left exceeds the amount earned from them. At that point we have five choices: recycle or reuse existing supplies, waste less, use less, try to develop a substitute, or do without and wait millions of years for more to be produced.

Nonrenewable Resources that cannot be Recycled

Resources that exist in a fixed quantity in Earth's crust and thus theoretically can be completely used up are called nonrenewable (or exhaustible) resources. On a time scale of millions to billions of years, such resources can be renewed by geological process. However, on the much shorter human time scale of hundreds to thousands of years, these resources can be depleted much faster than they are formed.

Fossil fuels are derived from organic matter that accumulated during hundreds of millions of year of early biogeological history. There is no way of recycling the energy in fossil fuels.



Energy flow through Fossil Fuels Coal, oil and Natural gas are derived from photosynthesis of early geological times, deposits are limited and they are used and gone for ever

Nonrenewable resources that cannot be recycled are those " mineral" energy resources, namely, fossil fuels (coal, oil, and natural gas), that presently supply better than 90 percent of our energy, and uranium that is used for nuclear (atomic) power.

Nonrenewable energy resources, such as coal, oil, and natural gas, can't be recycled or reused. Once burned, the useful energy in these fossil fuels is gone, leaving behind waste heat and polluting exhaust gases. Most of the per capita economic growth has been fueled by relatively cheap nonrenewable oil, which is expected to be economically depleted within 40 to 80 years.

2. Limits of Renewable Resources

Destruction versus Conservation

In theory, a renewable resource can last forever. Unfortunately, the term renewable source is often taken to mean inexhaustible resource. All renewable resources are sharply named by the capacity of natural systems to renew them. For example, ground water is renewable only at the rate of which water continues to percolate into the soil, in many areas, and water is being exhausted by withdrawing it faster than it is being replaced.

For example, between 25% and 50% of the world's wetlands (55% in the United States) have been either drained or built upon, or seriously polluted. Coral reefs are being destroyed in 93 of the 109 major locations locations. In many of the developed countries, diverse. old-growth forests are being and cleared and replaced with single-species tree plantation farms or with much less diverse second growth forests. Such practices reduce wildlife habitats and wildlife diversity. Overgrazing by livestock degrades a large area of land after year.

Thousands of wildlife species become extinct each year because of human activities. If habitat destruction continues at current rates, as many as 1.5 millions species disappear over the next 24 years a drastic loss in vital earth capital. These example help explain why most environmental scientists believe that over the next few decades, the danger of degradation and depletion is greatest for potentially renewable resources, these nonrenewable resources (except for petroleum and perhaps a few scare minerals) we can't find economically and environmentally acceptable substitutes.

Biological species or products also represent a renewable resource, but only so long as a depending population is maintained. Many species have been driven to extinction and consequently we have lost these resources forever. Renewable resources may be adversely conducted or even totally destroyed by means other than direct use. Renewable resources are renewable and will last only so long as our use of them remain within the capacity of the system to renew itself and effort is made to project the system from undue interference from errors such as population and habitat destruction. Learning to manage and use renewable resources in accordance conservation.

Concept of Maximum Sustained Yield

For conservation of renewable resources the main thrust will be the concept of maximum sustained yield detracted as the maximum rate of use of a renewable resource, which can sustain without damaging or impairing its renewability.

For e.g. if 50 animals produce 10 offspring a year and if 10 other animals are replaced by 10 young ones each year, the maximum sustained yield from this population is 10 per year. If demand on animals increases to 20 per year, at the expense of the breeding potential of the population, such practice will lead to the extinction of the animals in less than 5 years.

Reason for Exceeding Maximum Sustained Yields

(a) Greed

Perhaps the most obvious reason for consuming a renewable resource beyond its maximum sustained yield is greed. Instant profit is resorted to by human beings not caring for long lasting durable profit. Concept of sustained yield is voluntarily abstained.

(b) Tragedy of the Commons

Second, even when individuals or groups such as fisherman realize that that are exploiting their resource (fish) leading to their own long-term detriment, they find it impossible to stop the tragedy of the commons. This is due to logic that prevails, that the fish is a common property and the fisherman who catches more fish gets more benefited. If one fisherman did not take advantages another would. The result will be that fisherman that will exploit by excess fish catch creates negative to sustainable yield and leads to the tragedy of another common:

(c) Economic of Supply And Demand

A factor which aggravates exploitation of a resource either through greed or through the tragedy of the commons is the general economic relationship between price and supply; as supply diminishes, price increases. In turn, the rising price increases the potential for short-term profit and makes it increasingly tempting to further exploit already overexploited resources and hence deplete them to a point of no return.

(d) Need

People who take more than maximum sustained yield of a resource may be doing so out of need to meet basic necessities. There are hundreds of millions of people in the world who do not have enough to eat. Consider, for example, a poor farmer whose very survival depends on animals grazing on land that is already overgrazed. Can such an individual by convinced that it will be better to starve his family and himself this year in order to preserve the grassland for next year.

(e) Ignorance

Overharvesting may occur partly from ignorance of what the maximum sustained yield actually is. It one thing for a rancher to determine sustained yield when the cattle can be accurately observed; it is quite another thing for fisherman to determine their maximum sustained yield when they cannot directly see their resource.

3. Conservation and Natural Resource Management

Conservation is defined as “The optimum allocation of natural, human and cultural resources in the programmes at national development” (H.M. Rose 1958).It is derived from two Latin words con-together and server-to keep or guard measures an act of preservation or to keep together. Environmentalists consider conservation as hoarding or to control supply of goods in such a way that some part is left for nature. However, some others interpret conservation as total protection or restriction of consumptive use of resources like wild life (means complete ban on killing any animal) and forests (means complete stopping of felling of trees).

World Conservation Strategy defines conservation as “ the management of human use of the biosphere so that it may yield the greatest sustainable benefits to present generation, while maintaining its potential to meet the needs and aspirations of future generations. Thus, conservation is a twofold :(i) preservation of quality of environment and (ii) to ensure continuous yield of useful material, living or non-living or non-living, by establishing a balanced cycle or harvest and renewal.

The concept of resource conservation has now come under a still wider field of environmental management which is, in essence, the process of allocating natural and manmade resources so as to make optimum use of the environment in satisfying basic human needs at the minimum and more, as far as possible, for an indefinite future and at the same time preventing depletion and degradation of resources.

The global population, however, cannot and should not overlook and deny the fast deterioration of environment world over, resulting in dwindling natural resources, pollution of air, water and land, extermination of a life forms, dwindling health status, danger to cultural assets and many socio-economic backlashes. The root of the problem lies in too many people using too many resources wastefully

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