

Study unit 6: Natural Resource Management

6.0 Overview of natural resource management

A more realistic way to analyze resource use is to include long term economic benefits of not using them. When this is done less resource use will translate to greater economic benefits. The total economic value of rainforest for instance is usually greater if the forest is utilized over a long time span for tourism, pharmaceuticals, native foods, and other uses than if it is cut down for a one-time (short-term) gain in lumber that leaves the forest unusable for decades or centuries. The total value of the rainforest is enhanced even more if extremely long-term environmental benefits are included, such as the value of the forest to future generations.

Proper resource management is therefore based on recognition that less resource use can lead to long term economic benefits and reduced environmental costs. Such management, while recognizing that some resource use is unavoidable thus seeks to minimize use where possible.

6.1 Three basic options that can ensure minimum resource utilization

Resource management is encompassed with three basic options that can ensure minimum resource utilization; which are; Preservation, Conservation and Restoration.

6.1.1 Environmental Preservation

This refers to nonuse. A “preserved” national park or wilderness area is an ecosystem that is set aside and (in theory at least) protected in its pristine condition or natural state. In this areas consumptive use of products are prohibited.

6.1.2 Environmental Conservation

This is an attempt to minimize use of natural resource. This can be attained through efficiency improvements, recycling or reuse and substitution of other resources. Environmental conservation usually ensures longevity in resource utilization. When environment is conserved the resources therein are conserved. Resource conservation is important as it;

- (a) Slows depletion of resources

- (b) Reduces pollution by slowing flow of materials and energy through society and
- (c) Saves money for example burning less coal by increasing power plant's efficiency not only saves coal but produces less acid rain and other forms of pollution.
- (d) It is also cheaper to design power plants to burn less coal than to pay for all the pollution control devices needed to trap the air pollution in the smokestack and then dispose of the trapped pollutants. This entails that the costs of rehabilitating degraded areas are so high.

6.1.3 Environmental Restoration

This is the process of returning a degraded resource into its original state. The rapidly growing field of restoration ecology is attempting to return many ecosystems, such as tall grass degraded grasslands and wetlands into their original state. Mining activities in most cases alter the nature of landscape and many plants are cleared and their existence is therefore threatened. After mining operations especially open cast mining deliberate efforts should be taken to restore the origin landscape i.e scenery of the place in question and its plant population (fauna and flora)

Or

Environmental Restoration is the deliberate attempt to speed recovery of damaged areas. It ranges from practical and economic attempts to simply restore some productivity to degraded grazing lands, to the attempt to return full ecosystem function and structure in protected ecosystems. Restoration is needed virtually everywhere humans have been active past the hunter-gatherer stage. A third of the surface of the earth is afflicted with land degradation or desertification and this affects almost a billion people. Every year 6 million an additional hectares are completely lost to production according to U.N. estimates and 60% of the rangeland, 60% of rain-fed croplands and 30% of irrigated croplands are at risk. Protecting and restoring damaged lands requires an understanding of ecology, economics, psychology and culture

6.2 Methods of Resource Conservation

The resources are well managed/conserved by three basic practices namely; Efficiency, Recycling and substitution.

6.2.1 Efficiency

Efficiency improvement is generally most effective and economically sound because many technologies and activities are wasteful and inefficient. Efficiency improvements occur when

the same task is accomplished with fewer resources. An example would be use of fuel efficient cars to conserve fuel. Between 1973 and 1992, the average efficiency of cars doubled in the USA from 14 to 28 miles per gallon. Such cars perform the same tasks as less efficient fuel cars but use fewer resources in doing so. As another example, about two-thirds of the water used in irrigation is lost through evaporation. Using micro-irrigation where water is carried by pipes and sprayed through small holes decreases water loss to less than 20%.

Inefficiency in resource utilization is costly to the economy but efficient utilization of resource results into enormous gains as it conserves resources like minerals and others.

Besides the economic savings, environmental savings from efficiency are also enormous.

Less depletion saves more resources for future generations.

Less resource extracted means less degradation of the land. Less resource use as well reduces environmental pollution which in a way translates into resource pollution.

Reduced usage and processing can as well control pollution. The amount of pollutants are greatly reduced from fossil fuels, much less pollutants are released when efficient engines are used.

6.2.2 Resource reuse and Recycling

Reuse occurs when the same resource is used again in the same manner, for example refilling soda bottles. Recycling is more or less similar to reuse but the resource is not used in the same form. With recycling the original materials are made into other devices for example soda bottles may be re- melted to make new bottles or other glass containers. Reuse as efficiency, reduces resource depletion and pollution from resource extraction and use. Reuse/recycling is useful in reducing solid wastes. This further spares land that would be used as landfills for such solid wastes.

Recycling scheme begins with virgin resources which are the original resources being extracted. The recycling loop begins just before the purchased product is discarded; the discard is reprocessed into the same or perhaps another product. The loop is closed when someone buys a product containing recycled material. This slows depletion of virgin resources and reduces pollution in two basic ways.

Most basic it reduces the amount of solid wastes that would have been discarded into landfills and incinerators. It further reduces wastes that would have been processed by extraction of more virgin resources.

Advanced form of recycling is pre-cycling. This is not actually recycling but conservation by increased efficiency, the same task is accomplished but fewer resources are used. For example reduce of packaging materials by concentration of foods. Concentrated foods require small package materials.

Unfortunately, the recycling loop is often not closed because, even though people are willing to sort and return recyclable wastes, there is always little demand to purchase the recycled products. The reasons for this are usually economic: when product are made from virgin resources are cheaper, the loop goes unclosed. If the costs of products made from virgin resources were increased to reflect their true cost to the environment, the price differential would disappear, and the loop could be closed.

6.2.3 Substitution

Substitution in terms of resources is the process whereby one resource is used instead of the other. Substitution can also help to reduce both depletion and pollution problems. It helps with depletion because when one resource is being depleted, a more common substitute can be used at a cheaper price. For example aluminium a very common metal in the earth's crust can sometimes be substituted for much rarer and more expensive in making alloys, equipments and other uses. Substitution reduces pollution when extraction, processing and disposal of substituted resources produce less pollution. For example many plastics last for 50 to 100 years in the environment before they significantly decompose. The plastics are made from non-renewable resource, petroleum, whereas trees are renewable. Such considerations have led to substitution of paper for plastic in many items, such as drinking cups and containers.

Although it can be useful in reducing resource depletion, substitution is often less desirable than efficiency improvements and reuse/recycle. Instead of reducing overall resource depletion substitution often simply switches depletion from one resource to another. This can be satisfactory if the new resource is renewable, as in paper or very abundant as with glass made from sand. Furthermore substitution does not solve the problems of pollution, solid waste or other output problems completely, for instance, the use of paper products offers many environmental advantages over plastic, but it may do little to solve landfill space problems. Paper is indeed a very big problem in urban areas currently.

It is very difficult to find affordable substitutes for some resources i.e water for most of its uses. There is hardly a substitute for drinking and agricultural water, so increased efficiency and recycle/reuse of waste water are the common options.

6.3 Sustainable Resource Utilization

Sustainable resource utilization means resource use process that bears within it elements of perpetual aspects of the same resources. Some impacts that emanate from resource misuse are permanent with far reaching fatal impacts. With sustainable resource utilization the resource use by the present generation should not deny the right for the future generation to use the same resources. Hence sustainable resource utilization means utilization of resources rationally on the basis that they can support the present and future generations.

The major aim of sustainable resource utilization is to attain sustainable development in which resources are used in solving the current problems without jeopardizing the possibility for the future generation to exist. In other words sustainable utilization of resources is the utilization of resources while observing resource management and conservation principles for the resources to last longer.

The basic resources of the world that are likely to subject the earth into crisis unless they are used with great care are water, air, forests, minerals, agricultural land, special ecosystems and tourism resources. Below is a description of how some of these resources can be used to ensure longevity and maintain yield.

6.3.1 Water resources

Water must be considered in terms of quality, quantity and accessibility. For instance lakes, rivers, swamps, underground waters are necessary to support population and economic development of the people. The critical shortage of water inhibits economic development and directly damage people as diseases may erupt. Major economic sectors like transport, agriculture and industries depend on water at one point for proper function.

Sustainable utilization of water involves channeling and absorbing excess water, efficient distribution of the available water, avoiding disposing wastes in water bodies that interfere with water quality, avoid cultivation along river banks and at river sources.

Water reservoirs should be constructed to tap rain water to avoid risk of shortage during dry period.

6.3.2 Minerals like iron ores

Minerals like copper, tin, mica; diamond, gold etc. have greater contribution towards economic development hence these nonrenewable resources need to be managed properly. When managed properly mines will yield economic products for a long time.

Governments and companies involved in mining activities should have proper environmental rehabilitation projects, like reclamation of the soil, planting of trees, enacting laws and regulations to reinforce mining companies to rehabilitate land when mining activities cease in a particular place.

6.3.3 Forests

Forests should be used with conservation mind because careless use of trees may lead to their disappearance. There should be proper reforestation programs to ensure that deforested areas are rehabilitated. Only mature trees should be harvested. Alternative sources of energy should be sought to relieve forests of the pressure pressed to it by both rural and urban population.

6.3.4 Land

When land is used especially in agriculture, care should be taken to maintain nutrients in it. When nutrient in the soil decreases, proper fertilization preferably by using organic fertilizers should be done. Cultivation in areas which are prone to soil erosion should be properly done by using contours. Proper agronomic practices should be adhered to in order to avoid land degradation in course of agricultural activities. Rotational cropping is one of good agricultural practices that ensure safety to agricultural land.

6.3.5 Air

Air is the resource that is available everywhere on earth. Misuse of atmosphere by dumping in it undesirable gases, has led to major environmental problems facing the world today. The problems range from global warming, acid rain to depletion of ozone layer. There should be deliberate efforts to ensure discharge of harmful gases such as Chlorofluorocarbons (CFCs) into the atmosphere.

Rational utilization of resources for economic purposes will ensure continuous use of the same resource for a long time. On the other hand a wasteful use of resources will result into ill-effects which will come back to community and harm it, soon or later.

6.4 Resource Depletion

The pressure on the environment due to human activities has been greatly enhanced due to the accelerated use and depletion of natural resources. Given the finite nature of all resources the ultimate aim is to achieve sustainable use of the natural capital. When the rates at which certain resources are used exceed their ability to renew (replenish) themselves these resources are at risk of exhaustion.

The underlying cause of this exponential use is the exponential growth of human populations and technology that uses the resources. All resources on the earth are finite, limits to growth eventually occur, and demand exceeds supply. At this stage, society usually tends to intensify its efforts to obtain more of the resources through further exploration and increased technological applications.

However these efforts soon usually encounter what is termed Law of Diminishing Return, in economics, meaning that increasing efforts to extract resource produce progressively smaller amounts/returns. This results into depletion side of the bubble.

Production declines exponentially because the most easily extracted concentrations of the resource become exhausted. As supply of the resource decline, prices rise sometimes leading to unemployment and other unpleasant changes. Historically the society responds to the increase in resource prices by switching to another resource. England switched from wood to coal as energy, when forests were decimated and more recently to oil because it is cheaper. The series of bubbles shown in England has often been repeated elsewhere and with other resources as societies have tended to switch from one unsustainable resource to another. The only way to break this “cycle of Unsustainable use” is to switch to sustainable uses.

Self-Review Questions (SRQ) For Study Session 6

1. Explain three basic options for ensuring minimum natural resource utilization
2. How can we ensure sustainable utilization of water and forest resources in our country?