

EMT 301

PRINCIPLES OF NATURAL RESOURCES MANAGEMENT

COURSE WRITER

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EMT 301: PRINCIPLES OF NATURAL RESOURCES MANAGEMENT

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MODULE 1: NATURAL RESOURCES

Unit 1: Principles of Natural Resources Management

Unit 2: Origin and types of natural resources

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Unit 1: PRINCIPLES OF NATURAL RESOURCES MANAGEMENT

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1.0 INTRODUCTION

Natural resource management deals with managing the way in which people and natural landscapes interact. It brings together land use planning, water management, biodiversity conservation and the future sustainability of industries like Agriculture, mining, tourism, fisheries and forestry. Natural resources include water, air, coal, oil, natural gas, phosphorus, iron and other minerals. There are also biotic natural resources which include fossil fuels such as coal and petroleum which are formed from organic matter that has decayed. Abiotic resources come from non living and non organic materials. Examples of these resources include land, fresh water, air, heavy metals (gold, Iron, Copper, silver).

In this unit, you will learn the concepts/ principles of Natural Resources management.

2.0 OBJECTIVES

At the end of the unit, learners should be able to:

- Define natural resources and its concepts, resource management, natural resources and principles, types and importance.

3.0 MAIN CONTENT

3.1 DEFINITION OF BASIC CONCEPTS

It will be good to acquaint ourselves in this course with the principles of Natural Resources Management by understanding the meaning of certain concepts and terms contained in this course.

3.2 NATURAL RESOURCES

Highlight the concept of resources and thereafter natural resources

Natural resources are naturally occurring resources found either below, above, on the surface of the earth, in water, in the air or anywhere around the environment. They are materials or substances occurring in nature which can be exploited for economic gain. Natural resources include raw materials such as fuels, minerals and metals, soil, water, air, sunlight, land, biomass and ecosystems. Natural resources also include living (biotic) and non living things (abiotic). It also includes vegetation, human beings, animals and birds with other microorganisms.

3.3 NATURAL RESOURCES MANAGEMENT

Natural resource management deals with managing the way in which people and natural landscapes interact. Natural resources management also focuses on how management affects the quality of life for both present and future generations. It brings together land use planning, water management, biodiversity conservation and the future sustainability of industries like Agriculture, Mining, Tourism, Fisheries and Forestry. It recognizes that people and their livelihoods rely on the health and productivity of the landscape.

3.4 IMPORTANCE OF NATURAL RESOURCES

Natural resources are very important for the development of any country. All the living things are dependent on natural resources directly or indirectly. Without the natural resources, living things cannot survive. There are different types of natural resources from which living things are getting benefit from such as timber and wood etc from the forest resources, irrigation and drinking water, from water resources and, minerals for industrial development. Other resources like solar energy, wind energy, tidal energy play a very important role in our daily life. Fossil fuels such as natural gas, coal, petroleum are sources which are used in day to day life. Nature also helps to maintain environmental balance and biodiversity. A lot of resources for the production of medicine are derived from natural resources such as plants, herbs and shrubs.

4.0 CONCLUSION

In the first unit of this course, you have learnt definition/ explanation of natural resources, natural resources management and importance of natural resources to humanity.

5.0 SUMMARY

The unit has made it possible to understand the concept of natural resources management. It also entails essence of natural resources to biodiversity and the ability to understand derivatives from natural resources to not only to humanity, ecosystem, biodiversity but to health too.

6.0 TUTOR MARKED ASSIGNMENTS

- (1) State clearly the importance of Natural Resources.
- (2) Using relevant examples, differentiate between Biotic and Abiotic Natural resources .

7.0 REFERENCE

M.E. Soule (1986) What is Conservation Biology? *Bioscience* 35 (ii) : 727- 734 (i) X ..????

“What is Natural Resource” Definition and meaning- Investorwords.com. Retrieved 2016-12-12.

UNIT 2: ORIGIN AND TYPES OF NATURAL RESOURCES

1.0 Introduction

The concept of natural resources in this unit will show the background, origin and, types of natural resources. Natural resources basically are grouped into sun energy resources, water resources, land resources, mineral resources including atmospheric resources. This unit therefore explains the various concepts of natural resources.

2.0 Objectives

At the end of this unit, you should be able to state the general overview, background and definition of natural resources. Also, state the origin and types of natural resources.

Explain with examples the nature of natural resources??? Place appropriately.

3.0 Main Content

3.1 Definition/ Meaning of Natural Resources

Natural resources are resources that exist without actions of human kind. This includes all valued characteristics such as magnetic, gravitational, electrical properties and forces on Earth. It includes sunlight, atmosphere, water, land (including all minerals), along with all vegetation, crops and animal life that naturally subsists upon or within the heretofore identified characteristics and substances.

Rainforests are often characterized by the biodiversity and geo diversity existent in their ecosystems. Natural resources are also materials and components that can be found within the environment. Every man-made product is composed of natural resources. A natural resource may exist as a separate entity such as freshwater, air as well as living organism such as fish or it may exist in an alternate form that must be processed to obtain the resources such as metal ores, rare earth metals, petroleum and most forms of energy.

3.2 Origin of Natural Resources

On the basis of origin, natural resources can be divided into two basic types:

Biotic –Biotic resources are obtained from the biosphere (living and organic material), such as forests, animals and the materials that can be obtained from them. The rainforest is an example of undisturbed natural resource. Forests provide timber for humans, food, water?? and shelter for the flora and fauna tribes?? and animals. The nutrient cycle between organisms form food chains and biodiversity of species.

Waterfalls provide spring water for humans, animals and plants for survival and also habitat for marine organisms. The water current can be used to generate electricity and turbines for hydroelectric generation. Fossil fuels such as coal and petroleum are also included in this category, because they are formed from decayed organic matter.

Abiotic resources are those that come from non-living, non-organic material. Examples of abiotic resources include land, freshwater, air, rare earth metals and heavy metals including ores such as gold, Iron, Copper and Silver.

3.3 Types of Natural Resources

Natural resources can be classified into-

- Potential resources- These are those resources that may be used in the future.For example, petroleum in sedimentary rocks that until drilled out and put to use remains a potential resource.
- Actual resources- These are resources that have been surveyed, quantified and are currently used for development purposes such as wood processing, which depends on technology and cost.
- Reserve resources- This include part of an actual resource that can be developed profitably in the future.
- Stock resources- These are resources that have been surveyed, but cannot be used due to lack of knowledge or technology on how to use them. For example, hydrogen and oxygen have adequate potentials for use in energy generation, but technology is yet to evolve the methods for using them at full capacity.

Natural resources can be broadly categorized as either renewable or non-renewable.

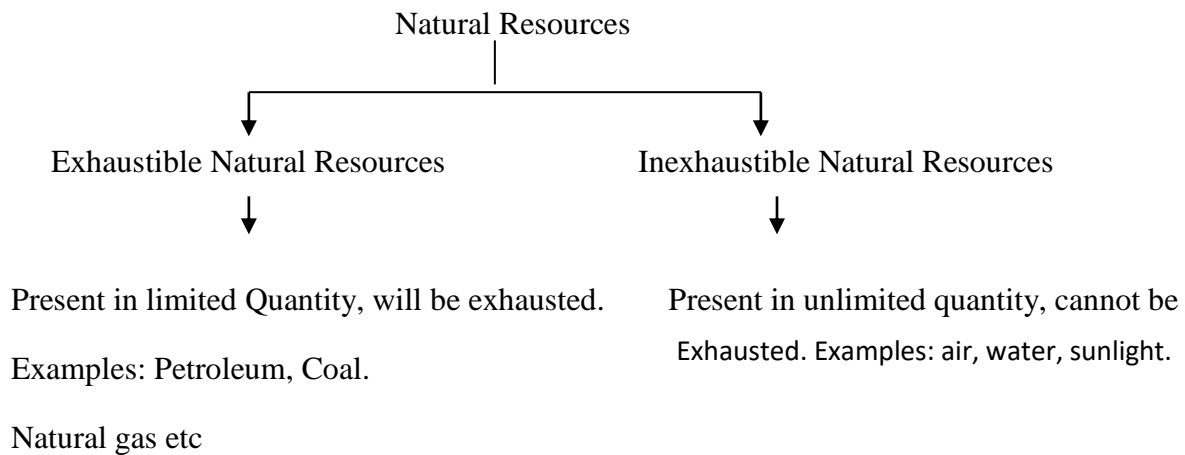
- Renewable resources can be replenished naturally.Meaning, they have the capacity for recovery after use. Some of these resources are sunlight, air, wind, vegetation,oxygen, wildlife and water which are continuously available and their quantities are not noticeably affected by human consumption. The use of these resources for energy generation,food production and meeting all kinds of societal demands is encouraged because of their renewability. Howeve,though many renewable resources do not have such a rapid recovery rate, these resources are susceptible to depletion by overuse. Resources from a human use perspective are classified as renewable as long as the rate of replacement/ recovery exceeds that of the rate of consumption. They replenish easily compared to Non-renewable resources.

Non renewable resources are resources that are finite(exhaustible).Meaning they are resources that cannot be renewed or recovered after use.It takes geological years for these kinds of resources to be regained after use. Non renewable resources either form slowly or do not naturally form in the environment. Minerals are the most common resource included in this category. Resources are non-renewable when their rate of consumption exceeds the rate of replenishment or recovery.A good example of this are fossil fuels because their rate of formation is extremely slow. Some elements deplete in amount without human interference and these are mostly radioactive elements such as Uranium, which naturally decay into heavy metals; of these, the metallic minerals can be recycled by recycling them, but coal and petroleum cannot be recycled.This is because once they are completely used, they take millions of years to replenish.

In terms of availability, natural resources can be either exhaustible or inexhaustible

Exhaustive natural resources are limited in supply and can be exhausted or diminished by human activities overtime. Examples of these exhaustive natural resources include coal, natural gas, petroleum.

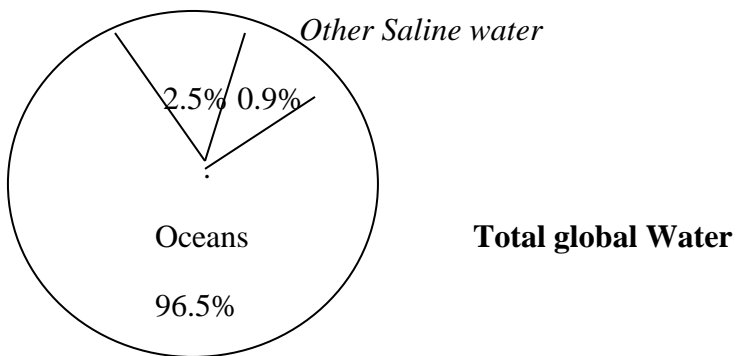
Inexhaustive natural resources are those resources which are present in unlimited quantity and cannot be completely used up by human activities. Examples are water, air, sunlight.(Merge the discussion of exhaustible and inexhaustible with renewable and non-renewable resources).This is to avoid repetition.



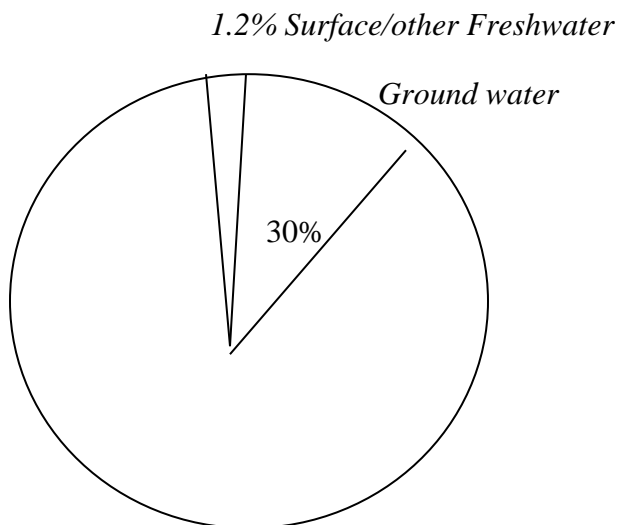
Water Resources are also natural resources that are potentially useful. All living things whether plants or animals require water because water resources are potentially useful.

All living things require water to grow, reproduce and nurture. About 97% of the water on the Earth is salt-water and only three percent is fresh water, slightly over two-thirds of this frozen in glaciers and polar ice caps.

(A) *Fresh water*



(B)



Glaciers and Ice cap 68.7%

Fresh water

(C)

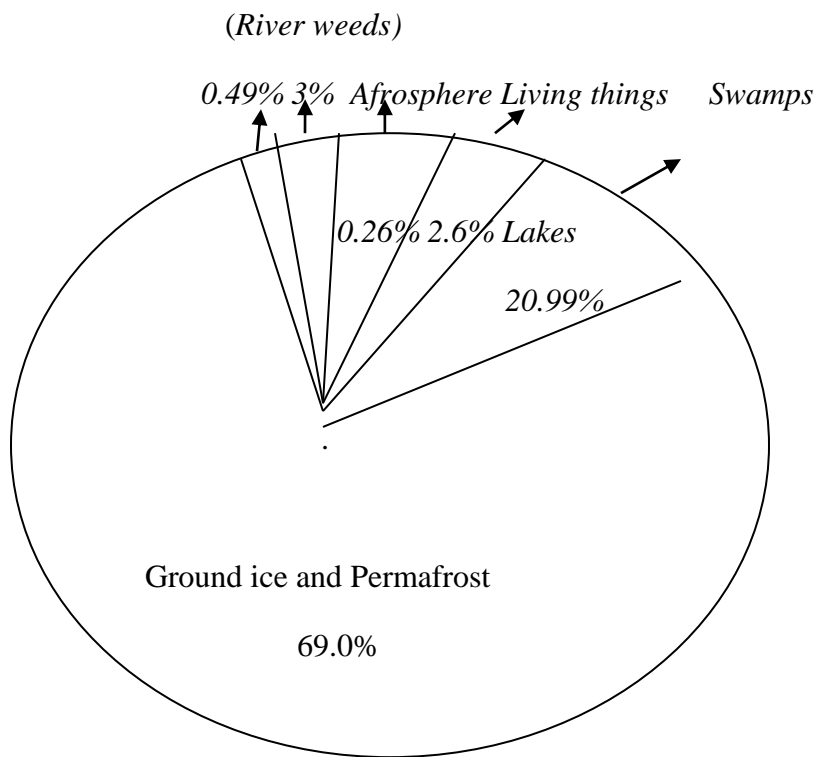


Figure.....?Surface Water and Other Freshwater

Source of information should be included

Surface Water and Other fresh water

Figure.... Shows a graphical distribution of the locations of water on earth. Only 3% of the earth's water is freshwater. Most of it is in ice caps and glaciers (69%) and groundwater (30%) while all lakes, rivers and swamps combined only account for a small fraction (0.3%) of the earth's total freshwater reserves. Water resources are natural resources of water that are potentially useful. Uses of water include agricultural, industrial, household, recreational and environmental activities. All living things require water to grow and reproduce. A total of 97% of the water on the earth is salt water and only three percent is freshwater, slightly over two thirds of this is frozen in glaciers and polar ice caps. The remaining unfrozen freshwater is found mainly as groundwater, with only a small fraction present above ground or in the air This is mentioned above. Edit to avoid repetition.

Freshwater is a renewable resource, yet the world's supply of groundwater is steadily decreasing with depletion occurring most prominently in Asia, South America and North America. Although it is still unclear how much renewal balances this usage, and whether ecosystems are threatened. The framework users of what?, (where such a framework exists) is known as WATER RIGHTS.

Sunlight as a Natural Resource

Sun is the star at the center of the solar system. It is a renewable resource, meaning it can be replaced once again and again. The sun provides heat, energy, light and vitamin D. Without the sun, the earth would be cold and a dark universe. The sun which is our local star is the source of life on earth. If the sun dies, so would the earth, hence sun is very important in our everyday life. Sun's energy is also important for photosynthesis. Animals also need light to grow, move about and to locate their food. Sunlight can be converted into energy called solar energy.

Why only discuss water and sunlight resources?

3.4 Importance of Natural Resources (Overview of Natural Resources Management)

What is this section discussing? Importance of natural resources or overview of natural resource management?

Natural resources management refers to the sustainable availability and utilization of major resources such as land, water, air, minerals, flora and fauna. Natural resources provide fundamental life support in the form of both consumptive and public good services. Ecological processes maintain soil productivity, nutrient recycling, the cleansing of air and water and climatic cycles. Biological diversity (biodiversity) is the occurrence of different types of

ecosystems, different species of organisms with the whole range of their variants and genes adapted to different climates and environments along with their interactions and processes. Biodiversity encompasses the variety of all life on earth. Genetic diversity describes the variation in the number and types of genes as well as chromosomes present in different species. The magnitude of variation in genes of a species increases with increase in size and environmental parameters of the habitat. Species diversity describes the variety in the number and richness of the species within a region. Ecosystem diversity describes the assemblage and interaction of species living together and the physical environment in a given area. It is referred to as landscape diversity because it includes placement and size of various ecosystems.

As the title suggest,explicitely discuss the importance of natural resources in this section.

4.0 Conclusion

In this second unit of the course you have learnt about the origin, types of natural resources, likewise the general background of the concept of natural resources management. We also learnt exhaustive and inexhaustive natural resources, components of water as a natural resource including sunlight.Environmental management is concerned with the use and conservation of natural resources, the protection of habitats and the control of hazards. Its field??? is applied ecology in the real sense, without regard to the disciplinary boundaries created by modern academic study. In terms of management, contributions are drawn from biology, botany, climatology, ecology, ecological economics, environmental engineering, fisheries, environmental law, management science, even zoology and other branches of sciences.Contributions from disciplines was not discussed, thus,cannot be part of conclusion

5.0 Summary

This unit clearly showed that natural resources can be biotic (living things) and abiotic (non-living things). You have learnt that natural resources can be classified into potential and actual resources. Natural resources can be reserve resources, renewable and non-renewable resources which can also be classified as exhaustible and non exhaustible natural resources. It is also shown in this unit that water resources are potentially useful and consists of oceans, freshwater, groundwater and ground ice and perma frost, and that natural resources management involved also sustainable availability and utilization of major resources such as land, water, air, minerals, flora and fauna.

6.0 Tutor Marked Assignment

- (i)Define the term Natural resources
- (ii)State the origin and types of Natural resources
- (iii)Explain briefly the concept of Natural resources management.

7.0 References

“Natural resources”- definition of natural resources in English. Oxford Dictionaries.

2014-04-20. Retrieved 2016-12-12.

“Definition of Natural resources Std. Dictionary wordcentral.com. 2012-09-20.

Retrieved 2016-12-13.

“What is Natural Resource” Definition and meaning- Investorwords.com.

Retrieved 2016-12-12.

General comment

There is a lot of repetition of information in this unit.

Unit 3: Environmental Resources

1.0 Introduction

2.0 Objective

3.0 Main Content

3.1 Definition of Environmental Resources

3.2 Types of Environmental Resources (Components of Environmental Resources)

3.3 Importance of Environmental Natural Resources

3.4 Factors Affecting Environmental Natural Resources

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignments

7.0 References

1.0 Introduction

In this unit, you will learn about Environmental Natural Resources, types and Importance. You will also learn about the factors affecting Environmental Natural Resources.

2.0 Objective

At the end of this unit, you should be able to know

- What Environmental Natural Resources are
- different types of Environmental Resources
- Importance of Environmental Resources
- Factors affecting Environmental Resources

3.0 Main Content

3.1 Definition of Environmental Resources

An environmental resource is any material, service or information from the environment that is valuable to the society. This can refer to anything that people find useful in their

environment or surroundings. Some resources are renewable or infinite and some are non renewable or finite. Food from plants and animals, wood for cooking, heating and building metals, coal and oil are all environmental resources as are the abilities of land, air and water to absorb society's waste products????.

Renewable resources like energy from the sun are plentiful and will be available for long time. Finite resources, like oil and coal are non renewable because once they are extracted from the earth and burnt, they cannot be used again. These are resources that are limited in supply and need to be used carefully. Many resources are becoming more and more limited especially as population and industrial growth place increase pressure on the environment.

. On the other hand, natural resources are naturally occurring substances that are considered valuable in their relatively modified form. Examples include petroleum, gas, gravel and sand.

Note: You have reported on renewable and non-renewable resources in the preceding unit. Define environmental resources and give examples

3.2 Components of Environmental Resources

On earth, environmental natural resources include sunlight, atmosphere, water, land, minerals vegetations, crops and animal life that naturally subsists upon or within the heretofore identified characteristics and substances. These components can be grouped broadly into two classes: ABIOTIC and BIOTIC Components.

Abiotic components consist of the non-living component of the environment which includes biosphere, lithosphere and atmosphere while biotic components consists of ----.

Biosphere

The biosphere of the natural environment is a diverse ray of living organisms (life form) and having varieties of plant species and diverse species of animals. The biosphere is the global ecological system integrating all living beings and their relationships, including their interaction with the elements of the lithosphere, geosphere, hydrosphere and atmosphere. The biosphere is postulated to have evolved, beginning with a process of **biopoiesis** (life created naturally from non living matter such as simple organic compound) or **biogenesis** (life created from living matter) at least some 3.5 billion years ago. All known life forms share fundamental molecular mechanisms and based on these observations, theories or the origin of life attempt to find a mechanism explaining the formation of a primordial single cell organism from which all life originate.

Lithosphere

Lithosphere is the rigid outer part of the earth, consisting of the crust and upper mantle. The lithosphere comprises a number of plates. Earth's lithosphere is also the rigid

(1)???Outermost shell of a terrestrial type, planet or natural satellite that is defined by its rigid mechanical properties. On earth, it is composed of the crust and the portion of the upper mantle. It has been generated largely by igneous processes in which magma (molten rock) cools and solidifies to form solid rock. Beneath the lithosphere lies the mantle which is heated by decay of radioactive events. The mantle, although solid in nature is in a state of convection. This convection processes causes the lithospheric plates to move, though slowly. The resulting process is known as plate tectonics. Volcanoes result primarily from the melting of subducted crust material or of rising mantle at mid-ocean ridges and mantle plumes.

Hydrosphere

The hydrosphere is the water body of the earth's natural environment and has the following components/divisions.

- (a) Ocean: The Ocean is a major body of saline water. Approximately 71%, of the earth's surface is covered by ocean, a continuous body of water that is customarily divided into several smaller seas. More than half of this area is over 3,000 meters deep. Average oceanic salinity is around 35 parts per thousand (ppt) and all sea water has salinity content. The hydrosphere also consists of rivers and streams where a river is usually a freshwater natural course flowing toward an ocean, a lake, a sea or another river(Edit this sentence). A stream is a flowing body of water with a current confined within a bed and stream banks. Streams play an important role in connecting fragmented habitats and thus conserving biodiversity.
- (b) Where is b etc?

Atmosphere: The atmosphere is the thin layer of gases that envelopes the earth and held in place by the force of gravity of the planet. The atmosphere retains heat during the night, thereby reducing daily temperature extremes. The atmosphere of the earth protects life on earth by creating pressure allowing for liquid water to exist on the earth's surface absorbing ultraviolet solar radiation warming the earth through heat retention (green house effect) and reducing temperature extremes between day and night (the diurnal temperature variation). By volume, dry air contains 78.09% Nitrogen, 20.9% oxygen, 0.93% argon, 0.04% carbon(iv)oxide and small amount of other gases . Air also contains a variable amount of water vapour, on average around 1% at sea level and 0.4% over the entire atmosphere. Air composition, temperature and atmospheric pressure vary with altitude and air suitable for use in photosynthesis by terrestrial plants and breathing of terrestrial animals is found only in earth's troposphere and in artificial atmosphere.

Why discuss only abiotic and nothing is mentioned of biotic

3.3 Importance of Environmental Resources

Identify and itemize environmental resources and discuss their importance and if possible of each of them

Sea grasses have been identified to be a key environmental resource because of their critical importance in providing habitat for large numbers of fish and shell fish species; their sensitivity to water quality degradation, their roles in nutrient cycling and improving the stability of bottom sediments. Environmental resource is any material service or information from the environment that is valuable to society why this here when you have mentioned it in your definition?. Clean land, air and water are environmental resources. Natural resources are very important for the development of our country. All living things are dependent on natural resources directly or indirectly. Without the natural resources, living things cannot survive.

There are different types of natural resources from which living things are getting benefits such as timber, wood from the forest resources, irrigation- water, drinking water from water resources, minerals for industry development. Other resources like solar energy, wind energy, tidal energy play a very important role in our daily life. Fossil fuels such as natural gas, coal, petroleum are the resources which are used in day to day life.

Natural resources are also important so that environment will be in balance. If we continuously misuse or overuse the natural resources like water, fuel, minerals, soils, they can affect the environment and all living things.

All the things we need in our daily life such as food, water, air, fuel, come from natural resources. Natural resources provide every daily needs to human like shelter, food, clothing. Land resources are important because human beings live there. Land resources support natural vegetation, wildlife, transport. Our basic needs like food, cloth, shelter are obtained from land. About 43% of the land is used for Agriculture. Our daily needs like grains, cereal, pulses are obtained from agriculture.

From mineral resources, rocks are used to build houses, bridge and other structure. A very important building material is concrete which is made from cement and cement is made from sedimentary rock known as limestone, glass and other ceramics are from rocks by treating them with heat. Rocks have been used as tools and weapons from very long time.

Petroleum is used in many ways like it is used as fuel, for motorcars and aeroplane. Petroleum is also distilled into liquefied petroleum gas (LPG) which is commonly used for cooking food.

3.4 FACTORS AFFECTING ENVIRONMENTAL/ NATURAL RESOURCES

1. What aspect of the effect?

2. Itemize the factors affecting environmental resources and discuss the factors

The following factors affect environmental/ natural resources:

- Greenhouse effect: is when sunlight rays are trapped within the atmosphere. Ultraviolet (UV) rays enter the atmosphere and bounce through the water and land then bounce back up to the atmosphere until it gets trapped, which creates heat. Greenhouse gases or CO₂ emission are the most commonly known of all climate changing factors. These are the chemicals that are spewed out into the atmosphere when fossil fuels like oil and gas are burnt. These chemicals are trapped in the atmosphere just like solar rays from the sun and get absorbed into all living life on earth which leads to diseases in humans and animals. On earth, there are several processes such as earthquakes, volcanoes and landslides, floods that affect the existence of living things. Volcanoes alone emit more CO₂ into the environment than many human activities. Itemize the each of the other factors just as done for green house effect Other factors that affect environment/ natural resources are over-exploitation of resources, destruction of ecosystem, to air and water pollution problems. Deforestation , indiscriminate bush burning, land mass clearing for agriculture or for urban development and mining activities can also lead to soil erosion; flooding and water pollution. Furthermore, gaseous emission and discharge of effluents from manufacturing industries can cause serious pollution of air and water. Severe soil degradation in the form of soil erosion can reduce the fertility status of rich land thereby causing poor agricultural yield while water pollution can negatively affect fish production in the ecosystem.
- Discharge of chemicals or using chemicals to kill fishes will change the colour and chemical composition of the aquatic life thereby making it inhabitable for many aquatic organisms.

1.0 Conclusion

In this third unit of our course, you have learnt about the definition of environmental resource, types/ components of environmental resource which include biotic and Abiotic components, others include the lithosphere, biosphere, hydrosphere and atmosphere. You also learnt about the factors affecting environmental resources such as the Greenhouse gas emission, flooding and the importance of environmental resources which include green grasses that provide habitation for aquatic life and provision of shelter materials among others.

2.0 Summary

In unit 3, we studied the definition of environmental resource which is any material or service?? or information?? from the environment that is valuable to society. It can be renewable or non renewable. Components of environmental resources such as biosphere, lithosphere, hydrosphere are also learnt in this unit. In terms of the importance, environmental resources enhance conducive life for human by mitigating the greenhouse

gases like CO₂ and provision of habitat for aquatic life. We also learnt about some factors that affect environmental resources such as pesticides and herbicide usage in agriculture, deforestation and mining which degrades the fertility of the soil and endanger human life.

3.0 Tutor Marked Assignments

- (1) Define the term environmental resource
- (2) What are the components of environmental resource?
- (3) State the importance of environmental resource

7.0 References

“Envirostats: Canada’s natural resource wealth at a glance” statcan.gc.ca.

Retrieved 2014-05-31

M.E. Soule and B.A. Wilcox (1980) Conservation Biology: An Evolutionary Ecological perspective. Sinauer Associates. Sunderland Massachusetts.

M.E. Soule (1986) What is Conservation Biology? 35 (ii) : 727- 734 (i??) X ..

Unit 4: Resource and Development Contents

1.0 Introduction

2.0 Objective

3.0 Main Content

3.1 Definition of Natural Resource and Development

3.2 Stages of Resource Development

3.3 Sustenance of Natural Resource

3.4 Components of Resource Development

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignment

7.0 References/ Further reading

1.0 Introduction

In unit 4, we considered the definitions of Natural resource development, concept of biological and mineral resources, sustenance of natural resources, stages and influence of deforestation on agriculture, natural resources and the reduction of the damaging of the natural environment which will affect natural resources.

Be consistent in your introduction of every unit. In some you presented what is to be considered in the unit while in others you gave an overview in the introduction.

1.0 Objectives

At the end of the unit you should be able to:

- Define resources management and development
- Know stages of resources development
- Appreciate components of natural resources

- Learn factors that affect natural resources

3.1 Meaning of Natural Resource Development

Natural resource development refers to the development of natural resources such as land, water, soil, plants and animals with a particular focus on how management affects the quality of life for both present and future generation. Environmental management ??is also similar to natural resource management.

Resource development means development that should take place without damaging the environment and development in the present should not destroy the ability of the future generations to meet their needs??.

*Resources are unevenly distributed. Is this resource development?

*In order to prevent wastage, development of resources is necessary.

Resources are the basic needs of human beings. Is this resource development?

*Hence resources that can be renewed should be developed so that they are not exhausted, thereby affecting life on earth.

*The two main types of resources are renewable and non-renewable resources. Renewable resources are regenerated (examples are oxygen, solar energy) while non-renewable cannot be regenerated and available quantities are limited (crude oil, coal, natural gas). So much has been said of this

Discuss what is natural resource development in this section. For example, it has to do with the catalogue of measures taken to improve the quality and quantity of resources in order to aid the ability of the resource to satisfy human needs (Give examples). It also includes deployment of all measures necessary to protect resources from despoliation and to increase resource sustainability (Give examples).

3.2 STAGES OF NATURAL RESOURCE DEVELOPMENT

Discuss the stages of natural resource development as the 3.2 suggest

Natural Resources management is concerned with the use and conservation of natural resources, the protection of habitats and the control of hazards. Its area of operation is applied ecology having interaction with biology, ecology, forest sciences, geology, zoology, botany, climatology and other disciplines.

Resources are also factors?? which can be used to satisfy human wants (any source of raw materials). Resources can be viewed in terms of materials example land, raw materials, human wisdom and knowledge and attributes of labour. A resource is therefore employed to meet

certain purposes or objectives. The essence of labour is because it is needed by somebody, the attribute of land is because it can be used for certain purposes and someone is willing to access it or take advantages of its identity, topography, accessibility and aesthetic values.

The values attached to natural resources depend on their usage; for example the context of agricultural land, in land water fisheries, mineral resources are influenced by social, economic and cultural and technological backgrounds.

Natural resources can be biological resources and mineral or non biological resources.

The biological resources include fishes, wildlife, livestock, forests and those are called renewable because they are capable of regrowth or regeneration.

Mineral resources for example; copper, tin, gold, petroleum are non-renewable resources because they cannot regrow or are not capable of regeneration except after long geological periods.

Both types of resources are exhaustible though biological resources are capable of replacing themselves as steady flow of them is utilized. Mineral resources are fixed which can diminish over time.

Renewable Natural Resources under these stages:

(i)Regeneration: Renewable natural resources undergo regeneration which means they have the abilities to regrow, regenerate, hence can be inexhaustible. They have the ability of self-regenerating and have perpetual production potentials and this does not affect the consumption of any other resource. Biotic/ biological are liable to be destructible, due to misuse and over exploitation leading to extinction or depletion.

(ii)Renewable resources also exhibit multiplicity of species interaction and dependence. The diversity and complex natures of species are key attributes of biological resources. They make their management difficult due to variations in the quality and uses of different species.

(iii)Grow rate: They also exhibit naturally determined growth rate. The rate of growth of biological resources is naturally determined by pre-determined biological processes. Due to growth is naturally determined; time is a major factor on the management of biological resources for this requires a minimum waiting period for the production of any desired product, with the implication for cost and return.

Input of Man-made Improvement

Technological advancement due to research leads to genetic improvement and hence high yield and thus reduction in management cost. This is achieved by de-emphasizing complexity of species composition in favour of few selected dormant species.

Ecosystem as Replica of Biological Resources:-

Biological resources exist in and constitute an ecosystem of flora and fauna. These conform to important principles of ecosystem such as selection, food chain in which the organism consume and are consumed by others in a particular order or hierarchy. The ecosystem develops towards a climax or a state of equilibrium when mortality balance with regeneration, though ecosystem tends to be dynamic rather than static because nature/ situation is not all that constant all the time.

Rewrite 3.2 to reflect the topic

3.3 SUSTENANCE OF NATURAL RESOURCES

Start with what is sustenance of natural resources

The essence of the sustenance of natural resources includes:

- Reduction of dependence upon synthetic chemicals and other unnatural substances.
- Reduction of dependence upon fossil fuels, underground metals and minerals.
- Reduced encroachment upon natural resources.
- Meet human needs fairly and efficiently.

Sustenance of natural resources can be enhanced also through:

- Reduction and clean up of pollution
- , Conversion of non- recyclable minerals into energy through direct combustion or after conversion into secondary fuels.
- Rreduction of societal consumption of non- renewable fuels.
- Development of alternative, green, low carbon or renewable energy sources.
- Conservation and sustainable use of scarce resources such as water, land and air.
- protection of representative or unique ecosystems; preservation of endangered species extinction.
- Establishment of nature and biosphere resumes under various types of protection and the protection of biodiversity and ecosystem upon which all human and other life on earth depends.

Natural Resources Sustenance from Environmental politics/ Replenishment of Environmental Resources

Some forms of natural resources can be replenished in relatively short periods of time through physical as well as biological processes. Physical processes of sustenance are input....., for example in dealing with soil structures and fertility levels, aquifers, the earth's atmosphere and ozone layer and the assimilation and waste processing capacities of our natural resource systems(Recast). All these types of renewable but exhaustible environmental resources have a physical capacity for renewal. This distinguishes them from natural resources in which the capacity for renewal is purely or predominantly biological such as fish stocks and forests and other flora and fauna and their related ecosystems. In terms of allocative problems, exhaustible resources for which physical as well as biological renewal are possible should prove more resilient to the demand humans place on them.

No mention of "from environmental politics" as reflected on the title.

3.4 FACTORS AFFECTING NATURAL RESOURCES DEVELOPMENT

Natural resources are of crucial importance for social and economic life. In this aspect, the diversity of nature not only offers man a vast power of choice for his needs and desires, it also enhances the role of nature as a source of solutions for future needs and challenges of mankind. These days, due to human pressure on natural resources and development, is greater than before in terms of magnitude and efficiency in disrupting natural and natural resources(Recast the sentence).

These factors that affect natural resources development include:

- Intensive agriculture which is replacing traditional farming. This, in combination with the subsidies of individual farming has had enormous effect on landscapes and continues to be threats to natural resources.
- Extensive tourism also affects coasts and mountains. The policies pursued in the transport industry, transport and energy sectors have a direct and damaging impact on the coasts, major rivers (dam construction and associated canal building) and road networks.
- The strong focus of forestry management on economic targets primarily causes the decline in biodiversity, soil erosion and other degraded effects.

Furthermore, natural resources are also affected by:

- Human intervention, such as construction of buildings, motorways or railways which result in the fragmentation of habitats which strongly limits the possibility for contact or migration among them. In extreme cases, even the smallest, narrowest connections between habitats are broken off. Such isolation is catastrophic for life in the habitat fragments.
- Loss of species of fauna and flora:

The biodiversity is affected by different species numbers and the loss of habitats in many regions. Approximately 30% of the vertebrates and 20% of heterplants are threatened. Threats are linked to loss of habitats due to destruction, modification and fragmentation of ecosystem as well as hunting and general disturbance.

- Reduction and fragmentation of habitats and landscapes in expansion of human activities into the natural environment, manifested by urbanization, recreation, industrialization and agriculture. This results in increasing uniformity in landscapes and consequential reduction disappearance, fragmentation or isolation of habitats and landscapes. The consequences are decreased species diversity, due to reduced habitable surface area which corresponds to a reduced species carrying capacity.
- The reduction of the habitats also affects the genetic diversity of the species living there. Smaller habitats can only accommodate smaller populations as a result; there is an impoverished gene pool. The reduction of genetic resources of a species diminishes its flexibility and evolutionary adaptability to changing situations. This has negative impacts on its survival.

4.0 Conclusion

This unit has briefly shown the concept of Natural resources development, stages of natural resources development in terms of sustenance/ sustainability of the natural resources. The unit also showed factors affecting the sustenance/ sustainability of natural resources.

5.0 Summary

In unit 4 we defined natural resources development as the concept which concerned the use and conservation of natural resources, the protection of habitats and the control of hazards.

Natural Resource development entails development that should take place without damaging the environment and present development should not destroy the ability of the future generation to meet their needs. This then entails that all renewable resources are sustained.

In terms of the stages of development of natural resources, you learnt that resources can be biological and mineral resources which can be regenerated or not regenerated.

You also learnt that natural resources can be affected positively or negatively by man's influence in agriculture and other activities.

Factors affecting natural resources include among others extensive tourism, deforestation, pesticide usage and constructions by human beings.

6.0 Tutor Mark Assignment

- (1) List the factors affecting natural resources development.
- (2) Differentiate with examples renewable and non-renewable resources.

7.0 References

Natural resource dictionary definition Natural resource defined. Your dictionary.com 2016-12-12.

Earth's natural wealth: an audit –science.org.au May 23, 2007- July 20, 2008.

“Peak everything” – reason. Com April 27, 2010.

Fundamentals of Conservation Biology. Blackwell Science Inc. Cambridge, Massachusetts, ISBN 0-86542-371-7

Use APA manual for references

MODULE 2: RATIONAL USE OF RESOURCES

Unit 1: Concept of sustainable development resources

Unit 2: Management of forests, grazing, lands.

Unit 3 Conservation of soils, food, minerals

Unit 4: Community resource development

Unit1: Concept of sustainable development of resources

1.0 Introduction

2.0 Objective

3.0 Main content

3.1 Meaning of sustainable development of resources

3.2 Problems of sustainable development of resources

3.3 Conservation of sustainable development of resources

3.4 Impact of sustainable development of resources

4.0 Conclusion

5.0 Summary

6.0 Tutor marked assignment

7.0 Reference/further reading

1.0 Introduction

In this unit, you will know the meaning of sustainable development of resources, limitations of sustainable development of resources , conservation measures and impacts of resources on what?

2.0 Objectives

At the end of this unit, you should be able to:

- Know the meaning of sustainable resource development
- Identify the obstacles/limitation affecting resources
- Learn conservation measure of sustainable resource development
- Know the impacts of resources to humanity, environment and ecosystem

3.0 Main content

3.1 Meaning of Sustainable Development of Resources

Sustainable development means ways people use resources without resources running out. The term used by the **Bruntland** Commission(Year) defined it as “development with sustainability that meets the need of the present without compromising the ability of future generations to meet their own needs”.

Everyone wants a better place to live. Some people want better homes and housing, while others may want better schools, more jobs, cleaner sheets etc.

- People need a better environment that means green spaces, play areas, no litter, nice gardens, decent houses, less noise and pollution. The resources used should renew over generations.
- A better economy, that means jobs, reasonable prices, cheaper heat and light
- Better social conditions that mean good leisure facilities, lots of community groups offering sports and arts, friendly neighbors.(Link it to sustainable development of resources)

Sustainable development of resources principles include;

- Reduced dependence on fossil fuels, underground metals and minerals.
- Reduced dependence upon synthetic chemicals and other unnatural substances
- Reduced encroachment on nature
- Meet human needs fairly and efficiently

The goals for sustainable resource development include;

- Preservation of endangered species extinction
- Protection of ecosystem and biodiversity upon which all life depend
- The establishment of nature and biosphere under various types of protection
- Conservation and sustainable use of scarce resources such as water, land and air
- Development of alternative, green, low carbon or renewable energy resources
- Converting of non recyclable materials into energy through direct combustion or after conservation into secondary fuels

3.2 Problems/limitations of Sustainable Development of Resources

Natural resources are subject to increasing scarcity due to rapid environmental change, increasing demand and their unequal distribution. Natural resources change may involve land and water degradation, overexploitation of wild life and aquatic resources, extensive land cleaning or drainage climate change.

Natural resource scarcity may also result from the unequal distribution of resources among individuals and social groups or ambiguities in the definition of rights to common property resources. The effects of environmental scarcity such as constrained agricultural landed output, constrained economic production can affect or limit sustainable resource development.

Natural resources are limited because these resources are used by people in ways that are defined symbolically. Land, forests and waterways are not just material resources people compete for, but are also part of a particular way of life (farmers, rancher, fisher, logger), an ethnic identity and a set of gender and age roles.

Another limitation or challenge of sustainable development of resources is human behavior. This is as a result of rapid growth of human population world wide which affects the resources in various ways. These human behaviours include; agricultural burning, overconsumption of resources, failure to recycle what?, production/disposal of toxic waste, improper disposal of human waste and garbage and misuse of pesticides etc. Other limiting factors as a result of human behavior include depletion of soils by overcultivation, erosion from removal of vegetation, removal of carbon sinks (trees), inefficient use of fuel and urbanization of farmland etc. In this aspect, human beings must make effort to conserve croplands, fresh water, energy, biodiversity and other life supporting natural resources. Developed countries should assist by reducing high consumption of all natural resources, especially fossil fuels.

Another limiting factor is inability to replace ecological functions. While it is possible to find ways to replace some natural resources, it is much more unlikely that they will ever be able to replace ecosystem services as the protection provided by the ozone layer, or the climate stabilizing function of the forest.

Another limitation to sustainable resource development is natural resources multifunction. In this aspect, forests for example does not only provide the raw material for paper which can be substituted quite easily, but they also maintain biodiversity, regular water flow and absorb carbon (iv) oxide, CO₂.

Partial irreversibility of natural resources is another problem of natural resources since their deterioration lies in their partial irreversibility. For instance, the loss in biodiversity is often definite and consumption of natural resources or capital may have no observable impact until a certain threshold is reached. For example, a lake can absorb nutrients for a long time while actually increasing its productivity. However, once a certain level of richness is achieved, there is a lack of oxygen which causes the lake's ecosystem to breakdown.

3.3 Conservation for Sustainable Development of Resources

The term conservation of natural resources depicts the management for human use of natural resources so that they may yield the greatest sustainable benefit to the present generation, while maintaining their potential to meet the needs of future generation.

It can also be defined as the presentation of genetic resources for rational use. Wise utilization and conservation of resource should be perceived within the context of sustainable development.

It can also be defined as sustainable use and protection of natural resources including plants, animals, mineral deposits, soils, clean water, clean air and fossil fuels such as coal, petroleum, and natural gas. The objective of resource conservation are to:

- Ensure endless use of renewable resources

- Avoid reckless depletion of non-renewable resources
- Avoid extinction of biodiversity that may be actually or potentially beneficial
- Ensure further development of the resources
- Check or prevent any negative environmental externalities arising from exploitation
- Ensure significant reduction in the level of wastage of natural resources

a. To preserve genetic diversity

b. To maintain essential ecological processes

c. To ensure the sustainable utilization of species and ecosystems.

There are two methods of genetic resources; in situ and ex situ.

In situ means conserving the genetic resources where the resources or its immediate parents were growing or living. In situ conservation thus, implies protection of the resource in its vicinity eg nature reserve, forest reserve, game and national park. Ex situ means that resource is protected at a place outside the distribution of the parent population. For example, zoological garden, botanical garden and seed bank.

. The goal of renewable resource conservation is to ensure that such resources are not consumed faster than they are replaced.

. Conservation of non renewable resources focus on maintaining an adequate supply of those resources well into the future.

Conservation of substantial resource development can be on the basis of **biodiversity conservation**. This biodiversity or biological diversity denotes the number and variety of different organisms and ecosystems in a certain area. Preserving biodiversity is essential for ecosystems to respond flexibly to damage or change. A single species of corn crop can be destroyed by a certain insect or disease but if several different species of corn are planted in the field, some of them may resist the insect or disease and survive. Human beings benefit greatly from the many medicines, crops and other products that biodiversity provides. It has been shown that a reasonable percentage of modern pharmaceutical medicines are derived from plants or animals; unfortunately, human activities have greatly reduced biodiversity around the world. The greatest threat to biodiversity is loss of habitats as human beings develop land for agriculture, grazing, livestock, industry and habitation.

The most drastic damage has occurred in the tropical rainforests, which cover less than 7% of the earth's surface but contain well over half of the planet's biodiversity.

Soil resource conservation

No statement linking the discussion on soil and water resource conservation

Soil is a polyphasic, heterogenous and dispersed system. Soil is also a mixture of mineral, plant and animal materials, which is essential for most plant growth and is the basic resource for agricultural production. Soil forming processes may take thousands of years and are slowed by natural erosion forces such as wind and rain. Human beings have accelerated these erosion processes by developing the land and cleaning away the vegetation that holds water and soil in place. Deforestation taking place in the tropics is especially damaging because the thin layer of the soil that remains is fragile and quickly wastes away when exposed to the heavy tropical rains. Agriculture, overgrazing and deforestation are mainly the degradation activities carried out by human beings.

In order to reduce deforestation, overgrazing, soil conservation involves reforming agricultural soil management methods and these can be carried out through strip cropping which entails alternating strips of crop and uncultivated land to minimize erosion and water runoff, contour farming, reduction of runoff, terracing which also reduces erosion and runoff on slopes, growing legumes to restore essential nitrogen in the soil and minimizing tillage, or plowing to reduce erosion.

Water conservation

Clean fresh water resources are essential for drinking, bathing, cooking, irrigation, industry and for plant and animal survival, though the global supply of freshwater are distributed unevenly.

Furthermore, the sources of most fresh water supplies- groundwater (water located below the soil surface), reservoir and rivers are under severe and increasing environmental stress because of overuse, water pollution, and ecosystem degradation. Over 80% of urban sewage in developing countries is discharged untreated into surface waters such as rivers and harbors. About 70% of the global freshwater supply is used in agriculture and 30% in the industry. Freshwater conservation therefore requires a reduction in wasteful practices like inefficient irrigation, reforms in agriculture and industry and strict pollution controls worldwide. Water supplies can also be increased through effective management and watersheds (areas that drain into one shared water way). By restoring natural vegetation to forests or fields, people can increase the storage and filtering capacity of these watersheds and minimize wasteful flooding and erosion. Restoration and protection of wetlands is crucial to water conservation. Wetlands stabilize groundwater supplies by holding rainfall and discharging the water slowly, serving as natural flood-control reservoirs.

3.4 Impacts of Sustainable Development of Resources.

t (ONLY FOREST?).

What are the impact of sustainable development of resources should be discussed in this section

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- s.

- Sustainable development of resources as agricultural resources also benefits the environment by maintaining soil quality, reducing soil degradation and erosion and saving water.

In addition to these benefits, sustainable agriculture also increases biodiversity of the area by providing a variety of organisms with healthy and natural environment to live.

In terms of human health benefits, crop grown through sustainable agriculture are better for people. Due to the lack of chemical pesticides and fertilizers, people are not being exposed to or consuming synthetic materials. This limits the risk of people becoming ill from exposure to these chemicals.

Also, the crops produced through sustainable agriculture can also be more nutritious because the overall crops are healthier and more natural. Sustainable agriculture has also had positive impacts to the environment. One major benefit to the environment is that sustainable agriculture uses 30% less energy per unit of crop yield in comparison to individualized agriculture. This reduced reliance on fossil fuels, results in the release of less chemicals and pollution to the environment.

Sustainable resource development also benefits the environment by maintaining soil quality, reducing soil degradation and saving water.

Furthermore, sustainable development of resources also helps to reduce *natural resource consumption*. Consumption of natural resources rises every year as human population increases and standards of living rises. The large, developed nations however are responsible for the greatest consumption of natural resources because of high standards of living. Conservation education and the thoughtful use of resources are necessary in the developed countries to reduce natural resource consumption. For instance, reducing the high demand for tropical hardwoods such as teak and mahogany in the United States and Japan would reduce the rate of tropical forest deterioration.

Conservation of natural resources is done to protect them from pollution. These include prohibiting or limiting the use of pesticides and other toxic chemicals, limiting wastewater and airborne pollutants, preventing the production of radioactive materials, and regulating drilling and transportation of petroleum products

Conservation of natural resources also helps to reduce waste. In this aspect, it is possible to reuse and recycle resources to reduce waste and resource consumption and conserve the energy needed to produce consumer products. For example, paper, glass, aluminum and motor oil can be

recycled. A preventive measure called precycline, a general term for designing more durable, recyclable products such as reusable packaging, encourages reuse.

Conservation of natural resources also prevents misuse of valuable resources. Some resources are so unique or valuable that they are protected from activities that would destroy or degrade them. For example, protecting national parks and wilderness areas from logging or mining because such activities would reduce the economic, recreational and value of the resource. Forests and wetlands (areas with high soil moisture or surface water) may be protected because they enhance air and water quality and provide habitat for a wide variety of plants and animals.

Itemize the impact of sustainable development of resources for better comprehension

4.0 Conclusion

In this unit of the course, you have learnt the meaning of sustainable development of resources. You also know the limitations of sustainable resource development which include human behavior, due to agricultural activities which degrade the soil and also cause erosion effects. Urbanization also affects resource development. You also learnt about the conservation of sustainable resources and the impacts of sustainable resource development which include reduced dependence on fossil fuels, underground metals and minerals and by maintaining soil quality, reducing soil degradation and saving water.

5.0 Summary

This unit indicated that sustainable resource development is a way for people to use resource without exhausting the resources . Sustainable resource development is affected by over exploitation of wildlife and aquatic resources, extensive land clearing or drainage or climate change, deforestation which can affect the fertility of the soil and cause erosion problem. Resources can be conserved by wise utilization of resources.

6.0 Tutor marked assignment

1. What is sustainable resource development?
2. What are the obstacles to sustainable resource development
3. List and discuss ways of conserving resources

7.0 References and other sources

Adams S. and David L. (2006): Earth science: An illustrated guide to science. New York, NY1001, Chelsea house. pp.20, earth science. ISBN. 0-81606164-5

Barbier, E. (2007). Natural resources and economic development, Cambridge university press.

Odum E.P (1971). Fundamentals of ecology, 3rd ed. Sanders New York.

Oldroyd, E.P. (1971). Earth cycles. A historical perspective . Westport, Connecticut: Greenwood, earth cycle. ISBN 0-313-33229-0.

Unit 2: Management of forestry, grazing, lands

1.0 Introduction

2.0 Objective

3.0 Main content

3.1 Forests

3.2 Grazing

3.3 Land (resources)

4.0 Conclusion

5.0 Summary

6.0 Tutor marked assignment

7.0 Reference/further reading

1.0 Introduction

You will know the definition of forests, grazing and land. You will also know the importance and management of forests and its types, grazing and land resources including the management s.

2.0 Objectives

At the end of this unit, you should be able to:

- Define forests, types and management
- Know what is grazing and the implications of grazing
- Learn the concept of land and land management

3.0 Main content

3.1 Forests

Forests are large areas covered chiefly with trees and undergrowth. It is a large number of dense mass of vertical or tangled vegetation. Forests can be woodlands, trees, tree plantation and plantation.

Forests are complex ecosystem consisting mainly of trees that buffer the earth and support a myriad of life forms. The trees help create a special environment which in turn, affects the kinds of animals and plants that can exist in that forest. Trees are an important component of the environment. The layers of leaves that fall around the tree prevent runoff and allow the water to percolate into the soil.

3.1.1.Types of forests

Types of forests are classified as:

a. Primary forests: This is a forest area that have never been logged and have developed following natural disturbances and under natural processes, not minding the age.

b. Secondary forests: These are forests regenerating largely through natural processes after significant human or natural disturbance and which differ from primary forests in forest composition and/or canopy structure.

c. Distributed forests: This is any forest type that have in their interior significant areas of disturbance including clearing, falling for wood extraction, anthropogenic fires, road construction etc.

d. Frontier forests: This is a large, ecologically intact and relatively undisturbed forests that supports the natural range of species and forest functions.

e. Forest plantation: It is one established by planting or/and seeding in the process of afforestation or reforestation. It consists of introduced species or in some cases indigenous species.

3.1.2.Importance of forests

The importance of forests include:

A. Forest products:

i. Wood is gathered for cooking. Forests provide useful wood products like whole logs which can be processed into building materials or into plywood products and furniture. Pulp is used for paper, boxes and a variety of other products.

ii. Forests are the source of numerous non-wood products including; barks, dyes, fibers, gums, latex, seed oils etc.

iii. Forests also produce fruits, nuts and berries which can be harvested for food and source of income.

B. Ecosystem services:

i. Climate is influenced by forests. Forests transport great quantities of water to the atmosphere through transpiration. Much of that transpired water replenishes the clouds and rain that maintains the forests. If the forest is cut, much more of the rain will become river water, flow to distant seas and the region will become drier. In this way, forests maintain local climate and strongly influence global fluxes of oxygen and carbon (IV) oxide.

ii. Forests protect top soil and enhance soil fertility. The annual flood crest of the falling down of the forest leaves, decay and form organic matter which help in the coagulation of the soil thereby, enriching the soil with nutrients and reducing leaching and degradation of the land.

iii. Forests harbour tremendous biological diversity. Forests have the potential to provide medicinal materials.

3.1.3. Management of forests

Forests should be protected from deforestation by constant replanting of trees cut down either for building materials, logging, agricultural activities and for construction purposes.

Therefore, forests can be deforested through agriculture, setting up of government institutions, inadequate distribution of wealth and power, population growth and overpopulation, urbanization, logging and firewood removals, government sponsored development projects and accessibility.

Discuss more on management of forest than deforestation

3.2 Grazing

Grazing is a method of feeding in which a herbivore feeds on plants such as grasses and other multicellular organisms such as algae. In agriculture, it is one method used whereby domestic livestock are used to convert grass and other forage into meat, milk and other products (Recast the sentence). Many small selective herbivores follow larger grazers which skim off highest top growth of grasses, exposing tender shoots. For terrestrial animals, grazing is normally distinguished from *browsing* in that grazing is eating grass or forbs, whereas browsing is eating woody twigs and leaves from trees and shrubs. Grazing differs from *predation* because the organism being grazed upon may not be killed.

3.2.1 Management of grazing

Grazing management has two overall goals (but you listed 4 issues. Is 3 and 4 part of the goals?), each of which is multifaceted.

1. Protecting the quality of the pasturage against deterioration by overgrazing, in other words, maintaining the sustainability of the pasturage.
2. Protecting the health of the animals against acute threats such as:
 - Grass leucism and nitrate poisoning
 - Trace elements overdose, such as molybdenum and selenium poison
 - Grass sickness and laminitis in horses

- Milk sickness in calves

3. Appropriate land use and grazing management techniques need to balance maintaining forage and livestock production while still maintaining biodiversity and ecosystem services. Through the utilization of grazing systems and making sure to allow proper recovery periods for regrowth, both the livestock and ecosystem benefits. Along with recovery periods, producers can keep a low density on a pasture, so as not to overgraze.

4. Controlled burning of the land can be valuable in the regrowth of indigenous plants and new lush growth.

Although grazing can be problematic for the ecosystem, well managed grazing techniques can reverse damage and improve the land.

3.3 Land

Land as a resource is fundamental to the operation of the biosphere and biodiversity. Alterations in the relative proportions of land are dedicated? to urbanization, agriculture, forest, woodland, grassland and pasture. This has a marked effect on the global water, carbon and nitrogen biogeochemical cycles and can impact negatively on both natural and human systems. The major sustainability benefits of land are accruing from sustainable parks and gardens and green cities?.

Furthermore, land resource refers to land available for exploitation, like non agricultural lands for building and developing townships. Land resources (natural resources; economically referred to as land or raw materials) occur naturally within environments that exist relatively undisturbed by mankind in a natural form.

3.3.1 Importance of land

Land is considered an important resource because it is being used by human beings for several purposes such as agriculture, forestry, mining, building houses and roads.

Also, it provides habitation to a variety of flora and fauna; hence, it is among the most important natural resources. (Avoid one sentence paragraph)

. The most important use of land to man is that it provides space for work. All activities of man takes place on land whether it is agriculture, transportation, industry, housing, mining etc.

. Most of the passengers and goods are transported by land.

. Land provides a large number of minerals like coal, petroleum, iron, copper, gold, mica etc.

3.3.2 Management of land

Land management is the process of managing the use and development (in both urban and rural settings) of land resources. Land resources are used in variety of purposes which may include organic agriculture, reforestation, water resource management and eco tourism projects. Besides agriculture and forestry, they include the mineral extraction sector, property and estate management(Relate it to land management?).

Land management is the process by which the resources of land are put to good effect.

Discuss some land management practices

4.0 Conclusion

Management of forests, grazing, and lands in this unit unfolds the definitions, types, importance and management practices of these natural resources. Pulps can be gotten from the forest, grazing as feeding for livestock can also enhance the degradation of the soil/land. Say something about land also

5.0 Summary

In this unit, forests are referred to as large areas covered mostly with trees and undergrowth. Forests are also complex ecosystem consisting mainly of trees that buffer the earth and support myriad of life forms.

Grazing is a method of feeding in which herbivores feed on plants such as grasses while lands resource refers to the land available for exploitation for various use like agriculture.

6.0 Tutor marked assignment

1. Explain the terms forests and grazing.
2. Enumerate the importance of land

7.0 References and further reading

Brady N.C (1996). *The nature and properties of soil*,include publishers

Ngwu O.E (2006)., Fidgina global books, Enugu

Scheihas J, and Russel G. (1996).*Forest patches in tropical landscapes*, island press.(Place of publication)

Unit 3: Management of soils, foods, minerals

1.0 Introduction

2.0 Objective

3.0 Main content

3.1 Soils

3.2 Foods

3.3 Minerals

4.0 Conclusion

5.0 Summary

6.0 Tutor marked assignment

7.0 References/further studies

1.0 Introduction

In this unit, you will be familiar with the concepts of soils, foods and minerals. You will also know phases of the soils, sustainable food system and types and uses of minerals.

2.0 Objectives

At the end of this unit, you should be able to:

- Define soil, food and minerals,
- Know the concept of soil as a dispersed system
- Learn the essence of food and mineral components

3.0 Main content

3.1 Soils

Soil has been described as the natural medium for plant growth, providing plants with mineral nutrients and water as well as anchorage. Soil is not only important as a medium for plant growth; it is also an important reserve for water storage and minerals; a medium for waste disposal and purification, and a material for structures, and foundations.

Soils are complex heterogeneous natural bodies. Soil can also be defined as polyphasic, heterogeneous and dispersed system.

In terms of polyphasic, it means that the soil is made up of many phases like air, water and solid phases. A phase in itself is a component of the soil that has its intrinsic properties quite different from others. Three states of matter are exhibited also in soils. These are **solid, liquid** and **gaseous** states. Most of the time, all three states occur in soils side by side; hence, these states may be called **phases** of the soil. About 50% of the soil constituent is made up of a solid phase while the liquid and gaseous phases have 25% respectively. (Merge 3.1 in a paragraph)

➤ **Soil solid phase**

This is called the *matrix* or *skeleton* of the soil and it is the product of weathering of parent rock/material and materials contained therein. It is the basis of all specific properties of the soil. The solid phase of the soil is made up of

i. Mineral matter from parent rock/material, which includes rock fragments, minerals, with definite crystalline structure (especially larger particles from original rock); amorphous inorganic materials of undefined precipitates of mixed hydrated oxides of iron, aluminum, manganese and silicon or undefined mixed amorphous silicate; and ii. Organic residues (plant and animal materials) ranging from colloidal size particles of molecular dimension to fibrous pieces of partly decomposed vegetative matter some centimeters long.

➤ **Liquid phase**

This is principally water. Soil solution is an aqueous solution of various electrolytes. Ions commonly found in solution include K^+ , Na^+ , Ca^{2+} , Mg^{2+} , Cl^- , NO_3^{2-} , SO_4^{2-} .

➤ **Gaseous phase**

This is known as the *soil air/atmosphere*. It is composed mainly of N_2 , O_2 , CO_2 and water vapor. Other gases found in the earth's atmosphere are at present in varying quantities in the soil air. The average density of the soil atmosphere is approximately 1.3kgm^{-3} .

(Not necessary) **3.1.1. Functions of soils**

i. Soils are an important natural resource on which we all dependent on

ii. Soil, however, is the natural resource we utilize to produce the majority of our crop plants.
Not function of soil This is not function of soil

iii. Soils act as a medium in which seeds, spores and corm germinate. This is because most seeds, spores, corm need the protection, warmth and moisture of the soil to enable them commence their life cycles.

iv. Soil provides support for many growing plants, that is, soil is essential as an anchorage for plants.

v. Soil is the main medium for water transfer to the roots of plants. This is so because soil is capable of holding moisture and air, both of which are necessary for plant life.

vi. It is through soil that nitrogen, potash, phosphorus, potassium, iron and other numerous mineral substances essential to plant life are supplied.

vii. Soil function as a habitat for organisms whose biological activities are responsible for recycling of mineral nutrients denied from organic matter.

3.1.2. Conservation of soils

Conservation of soil is the protection of soil against erosion or deterioration. It is also regarded as the preservation and careful management of soil resources for sustainable development.

Conservation/management of the soil can be carried out in the following ways:

- Soil management practices
- Soil erosion control techniques
- Land reclamation practices

Soil management practice

Soil conservation can be carried out using soil management practices which include the promotion of wise use of land so as to conserve its natural fertility or replace it with artificial fertilizers. These techniques involve crop rotation, the use of cover crops, fertilizers, manures, and mulching. Soil management practices can also involve various tillage systems such as zero tillage, aimed at preserving the soil cover of farm lands.

- Soil erosion control technique

The second category of soil conservation practice is the use of certain basic techniques for controlling erosion, such as contour farming, strip cropping and terracing. The technique adopted will be dictated by the type of cropping and nature of relief so as to reduce soil erosion on agricultural land.

Contour farming involves planting in rows or operating farm equipments across the slope. This method has been effectively used to reduce water loss and soil loss especially from sloppy lands thereby increasing farm yields substantially.

Terracing involves the building of mud embankments or a combination of channels and embankments across slopes, usually at fixed intervals. Terracing may involve creating flat or nearly flat surfaces along slopes that are normally too steep for cultivation. Generally, terracing

controls erosion by reducing slope length as well as slope steepness. It also slows down runoff which may also be conducted across the slope in definite channels where it flows at slower speed.

- Land reclamation practice

Highly eroded land either due to erosion, deforestation can be reclaimed through afforestation, the reservation of the whole areas to prevent or minimize the effects of human activities and the filling of the pits.

3.2 Foods

Any nutritious substance that people or animals eat or drink or that plant absorbs in order to maintain life is known as *food*.

Sustainable food system is one that provides healthy food to meet current food needs while maintaining healthy ecosystems that can also provide food for generations to come with minimal negative impact to the environment. A sustainable food system also encourages local production and distribution of infrastructures and makes nutritious food available, accessible and affordable to all. It is humane, protecting farmers and other workers, consumers and communities.

Globally, the environmental impact of agribusiness is being addressed through sustainable agriculture and organic farming. Local farmers are also being taught on the use of more productive use of urban wastelands and domestic gardens including permaculture, urban horticulture, local food, sustainable gardening and organic gardening.

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Environmental problems associated with industrial agriculture and agribusinesses are now being addressed through such movements as sustainable agriculture, organic farming and more sustainable business practices.

Furthermore, population growth also has influence on levels of consumption and the efficiency of resource use. The impacts of the growing world population on land, water, energy and biota resources are real and indeed overwhelming. Clear scientific evidence suggests that worldwide problems of food availability already have emerged. According to World Health Organization(Year), nearly 60% of the world population now is malnourished, and more people cover the earth through urbanization, highways and their activities impact on the availability of food resources.

3.3 Minerals

Minerals are substances that are formed naturally in the earth. Minerals are usually solid, inorganic, have a crystal structure and form naturally by geological processes. The study of minerals is called *mineralogy*. A mineral can be of single chemical element or more usually a compound. Mineral resources have a wide variety of uses and play a huge role in our lives. Minerals which people need include calcium, phosphorus, sulfur, copper, iron and zinc.

Mineral resources are a concentration or occurrence of solid materials of economic interest in or on the earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. Mineral resources can be divided into two major categories: *metallic* and *non metallic*. Metallic mineral resources includes the following; gold, silver, tin, copper, lead, zinc, iron, nickel, chromium and aluminum. Non metallic resources includes g; sand, gravel, gypsum, halite, uranium, dimension stone. Coal, oil and natural gas provide us with almost all of the energy we use to produce light, heat. Minerals are also common ingredients in pigments. Minerals are also important in the processing of materials.

➤ **Uses of minerals**

Minerals like copper are used in electrical equipments as it is a good electrical conductor. Clay is used to make cement which helps in constructing roads. Fiber glass, cleaning agents are made by borax. The uses of minerals in everyday life include:

:

- Uses of minerals in the body
- Uses of metallic minerals
- Economic uses of minerals

Uses of minerals in the body

Calcium gives structure and strength to bones and teeth. It also helps in blood clotting, enzyme function, transfer signals to nervous system. Iron is required in transporting oxygen from lungs to other parts of the body. Zinc plays a major role in the body's immunity. It fights infections and various illnesses.

Uses of metallic minerals

Minerals which consists one or more than one metallic elements are called *metallic minerals*. They include gold, silver, copper, iron(Say something about its uses).

Economic uses of minerals

Gold is used in computers and other electronics. It is also used in dentistry. Aluminum is used in beverage cans, aluminum foil, cosmetics. Graphite is used in machinery and pencils; potassium

is used in toothpaste and fertilizers. Minerals are also used in constructing building, developing weapons for defense, machinery, making jewelry and synthesizing fertilizers. Barite is a mineral consisting of *barium sulphate*, which is used in oil exploration and to prevent gushers; it can also be used for filler in paints, glass, toothpaste.

Chalcopyrite is the main ore of copper mostly found in igneous and metamorphic rocks. It has an attractive appearance and can be used in arts and decoration.

Fluorite is also called fluorspar. It is a halid mineral which consists of calcium fluoride, (CaF_2). It is used as a flux ie used as an intermediate chemical to separate metals from water material. Hydrofluoric acid is used in the pottery, optics and plastic industry. Fluorite is also used in making opalescent glass and in enameling cooking ware.

Limestone, from sedimentary rock consists of the mineral calcite (calcium carbonate). Limestone is used as building materials for ornamental store for surfaces and sculpture, to make cement and mortar.

➤ **Management of mineral resources**

Minerals are non renewable natural resources that are vital for the construction, manufacturing and energy industries. Also, it is important that the natural environment is protected from damage that may be caused by mineral extraction.

Measures to manage mineral resources include:

- Use of mineral in a planned and sustainable manner.
- Recycling of metals
- Use of alternative renewable substitutes
- Technology should be improved to us the low grade ores profitably(recast)

4.0 Conclusion

In this unit, you have learnt the concepts and management of soils, foods, and minerals. You also learnt that soil is made up of polyphasic, heterogeneous and dispersed systems. Food is any nutritious substance that people or animals eat or drink or that plants absorb in order to maintain life while sustainable food system is one that meets current food need while maintaining healthy ecosystem. We also learnt that minerals can be used in the body, as metallic minerals and foreconomic purposes. This unit also shows management of minerals

5.0 Summary

This unit has clearly indicated that natural resources include soils, foods and minerals. The soil phases also include; gas, liquid and solid phases. You are also made to know that soils can be degraded through soil erosion which can be reduced/checked using land reclamation, afforestation and terracing. It is also shown in this unit that minerals play a lot of roles in our lives and sustainable food system encourages local production and distribution of infrastructure made food accessible and available.

6.0 Tutor marked assignment

- i. Define the soil as polyphasic and heterogenous system.
- ii. What is sustainable food system?
- iii. Explain the term minerals and their importance.

7.0 References and other resources s.

Brady N.C (1996). *The nature and properties of soils*, Macmillian, New York.

Fatima M.S and David E. Bignet (2008). *A handbook of tropical soil biology*, Earthscan, UK.

Ngwu O.E, M.A.N Anikwe, Mba C.N (2005). *Ecophysiology and cultivation practices of arable crops*, New generation books, Enugu.

Units 4: Community Resources Development

1.0 Introduction

2.0 Objective

3.0 Main Content

3.1 Concept of Community Resource

3.2 Types/ Importance of Resource Development.

3.3 Sustainable Community Resource Development.

3.4 Implications / Challenges in Community Resource Development.

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignments

7.0 Reference of Further Studies

1.0 Introduction.

In this unit, we will consider concept of Community resource, types of resource development, how sustainable community resources can be and challenges or limitations affecting community resource development and ways of mitigating these challenges.

2.0 Objective.

At the end of this unit, you should be able to-

- Identify the concept of Community resources.
- Know types of Community resources.
- Identify some of the limitations affecting Community Resource Development.

3.0 Main content

3.1 Concept of Community Resources

Community resources are assets in a community that helps meet certain needs for those around them. These assets can be people, places or structures; and community services. These resources can be essential in developing skills post- discharge by helping the client diversify their range of outlets of support, expression and natural self – developments.

Examples of Community resources (assets, needs and community resources) include-

- Material resources; space supplies, funding, In-Kind donations.
- Skills: research, marketing, communication, finance / accounting and, event coordination.
- Access to certain individuals or organizations such as funders or elected officials.
- Visibility.
- Reputation of potential partners in the community and in the sectors.

Needs(this is addressing what?)

- Volunteers: Skills and numbers needed, variables that affect those needs (number of clients to be served, available supplies, transportation, weather etc.)
- Tangible resources: project supplies, goods, materials.
- Financial resources: Financial support needed and how it will be spent .

Community Resources:(Stand alone and not referring to anything)

- Individuals
- Associations
- Institution
- Corporations
- Cash and in – kind donations
- Physical space

3.2 Types of Community Resources

Discuss the types of community resources in this section

Community resources are the businesses, public service institutions and charitable organizations that provide assistance and services to local residents – Youth programs and services can be offered by churches , schools , government agencies and non- profit organization. The range of services touches the lives of everyone who lives in the community. Some services impact large

parts of the population, such as those provided by public libraries, churches and the post office. Community services can target a small segment of the population such as artistic individuals.

Youth Services(Is youth services the only type of community resource?)

Youth programs and services can be offered by churches, schools, government agencies and non- profit organization. Youth programs are targeted to children and young adults. Sponsored activities are designed to engage young people and provide them with opportunities to interact with their peers in a supervised environment. Youth programs may focus on one activity or offer many choices. They all promote youth development through social, educational and recreational activities.

3.3 Sustainable Community Resource Development

You have not discussed sustainable community resource development. Read the content in this section and do the needful

Rather than being a fixed thing, a sustainable community resource is continually adjusting to meet the social and economic needs of its residents while preserving the environment's ability to support it. "A" A sustainable community uses its resources to meet current needs while ensuring that adequate resources are available for future generations. It seeks a better quality of life for all its residents while maintaining nature's ability to function overtime by minimizing waste, preventing pollution, promoting efficiency and developing local resources to revitalize the local economy. Decision – making in a sustainable community resembles a living system in which human, natural and economic elements are interdependent and draw strength from each other. Potentially, significant employment opportunities, consistent with more sustainable patterns of development, exist in many economic sectors. Redesigned and improved infrastructure, knowledge – based service , environmental technologies, improved management and use of natural resources , and tourism are all rich areas of private sector investment, supportive training. Some of the most promising employment opportunities include:

- Upgrading the efficiency of energy use in buildings, products and transportation systems.
- Adopting and implementing sustainable forestry, fisheries, soil, and watershed management practices.
- Expanded delivery and use of information technologies
- Recycling and remanufacturing of solid and hazardous waste into marketable products.
- Accelerated and expanded development of marine and freshwater aquaculture
- Adding value to fish, agricultural and forest products.
- Developing, manufacturing and marketing products, services and technologies that reduce environmental burdens.
- Designing energy-efficient and people friendly cities.

Achieving sustainable community resource development means emphasizing sustainable employment and economic demand employment [EDM]. Sustainable employment includes turning “Wastes” into resources eg [recycling]; improving efficiency with regards to energy and materials; converting to greater reliance on renewable energy sources , eg food, and energy production , and sustainable management of natural resources (eg community forestry) , EDM shifts our economic development emphasis from the traditional concern with increasing growth to reducing social dependence on economic growth.

See A under 3.3.A sustainable community uses its resources to meet current needs while ensuring that adequate resources are available for future generations. It seeks a better quality of life for all its residents while maintaining nature’s ability to function overtime by minimizing waste, preventing pollution, promoting efficiency and developing to revitalize the local economy. Decision- making in a sustainable community starts from a rich civic life and shared information among community members .A sustainable community resembles a living system in which human, natural and economic resources/ elements are interdependent and draw strength from each other.

3.4 Challenges / Implications of Community Resources Development.

Clearly discuss the challenges/implications of community resource development in this section so that the reader can follow

Among the limitation/ challenges of community resource development include these reasons- economic and financial crises followed by political chaos affecting socio economic and political settings, livelihood dependency, market pressure and dramatic climatic change and its impacts on local community and the resources themselves. The haphazard use of natural resources in many communities challenges the sustainability of natural resources and poses serious environmental threats, particularly deforestation and food degradation, biodiversity loss and ecosystem degradation, reduction in soil quality and fall in available water quantity.

Furthermore, community resource are not limited and consequences of careless and excessive consumption of resources lead to deforestation , desertification, extinction of species, forced migration , soil erosion , oil depletion and green house gas increase.

The exploitation of community resources is the use of natural resources for - Economic growth, sometimes with a negative connotation of accompanying environmental degradation. This normally starts on an individual scale as extraction and processing of raw materials (such as in mining, steam power, and machinery). Furthermore, these days every consumption is sustained by the extraction of fossil fuels, which consists of oil, coal and gas.

Another non-renewable resource that is exploited by human is subsoil minerals such as precious metals that are mainly used in the production of industrial commodities. Intensive agriculture is an example of mode of production that hinders many aspects of the natural environment, for example, the degradation of forests in a terrestrial ecosystem and water pollution in an aquatic ecosystem. As the world of population rises and economic growth occurs, the depletion of natural resources influence by the unsustainable extraction of raw materials becomes an increasing concern.

Furthermore, due to increase in the sophistication of technology enabling natural resources to be extracted quickly and efficiently, for in the past, it could take long hours just to cut down trees only using saws .Due to increased technology, rate of deforestation have greatly increased. High population of people on the community resources for according to UN, there were 7.6 billion people in 2017. This number is expected to rise to about 10 billion in 2050 and about 11 billion in 2100.

Culture of consumerism. Materialistic views lead to the mining of gold and diamonds to produce jewelry. Consumerism also leads to extraction of resources for the production of commodities necessary for human life but in amounts excessive of what is needed because people consume more than is necessary or waste what they have.

4.0 Conclusion

In this unit, you understand that community resources are assets in a community that help people meet certain needs around them. Community resources include individuals, association, institutions and even physical spaces. Furthermore , sustainable community resources (development) uses its resources to meet current needs while ensuring that adequate resources are available for future generation ; though community resource development such as economic and financial crises, lack of statutory power and even climatic change????.

5.0 Summary

You have been able to understand the concept of community resource development. In this unit, it was found out that with reduce to community resource development; the range of services touches the lives of everyone who lives in the community(Recast).

Furthermore, community services can also target a small segment of the population such as artistic individuals. Community resources are not fixed rather they are adjustable to meet the social and economic needs of the people. Among the limitation of community resources include political chaos affecting the socio- economic political settings and livelihood of the people.

6.0 Tutor Marked Assignment.

- (1) Define the term “Community Resources”
- (2) Discuss the limitations affecting Community Resource Development.

7.0 Reference and other resources.

Brady, N. C. (1996). *The Nature and Properties of Soils*. Macmillan, New York.

Pedro C. A, and Antonio M.A.(2004) .Mainstreaming mineral wealth Growth and Poverty .
Reduction Strategies Economic Commission for Africa.

Plana J and Florent A (2012) .The Exploitation of Natural Resources. Un An Pour La ; Brownel

MODULE 3: POPULATION AND PRESSURE ON RESOURCE UTILIZATION

Unit 1: Administration and management of natural resources in Nigeria

Unit 2: Resource economics and management

Unit 3: Environmental conservation

Unit 4: Protection of natural and conservation of species

Unit 1: ADMINISTRATION AND MANAGEMENT OF NATURAL RESOURCES IN NIGERIA

CONTENTS

1.0 Introduction

2.0 Objectives

3.0 Main content

3.1 Concept of the administration of natural resources in Nigeria

3.2 Concept of the management of natural resources

3.3 Ways of administering and managing of natural resources

3.4 Challenges affecting administration and management of natural resources

4.0 Conclusion

5.0 Summary

6.0 Tutor marked assignments

7.0 Reference and further studies

1.0 Introduction

You will now know the administration and management of natural resources. You will also know the challenges affecting the administration and management of natural resources

2.0 Objective

At the end of this unit, you should be able to:

- Define administration and management of natural resources; and
- Solution to the challenges affecting management of natural resources.

3.1 Concept of the Administration of Natural Resources in Nigeria.

Natural resources are defined as naturally occurring substances that are considered valuable in their relatively unmodified forms. Examples include petroleum, gas, sand and gravel.

Administration is designed to foster an orderly relationship (both personal, interpersonal and impersonal) in any organization. The administration will determine responsibilities that would lead to smooth running of the organization. Administration of natural resources acts as means of achieving an orderly organization of the resources to meet human needs.

Approaches to administration of natural resources in Nigeria includes:

- i. Administration of mineral and non-biological resources and
- ii. Administration of biological resources

i. Administration of mineral and non-biological resources

The management/administration of non-biological resources is by the federal government. The federal government nevertheless, directs and coordinates exploitation of natural mineral resources on behalf of all the citizens of the country. All companies responsible for mining and exploitation activities must obtain permission from the federal government. Revenues accruing from them go to a central national purse. A certain percentage of this revenue is paid to the state in which particular mineral is found, another percentage is set aside as ecological fund, while the remaining revenue and other revenues from other sectors of the economy are shared between the federal government and all the state government according to agreed revenue allocation formula.

Administration/management of petroleum and gas is under the auspices of the **federal ministry of petroleum resources**, while other mineral resources- gold, tin are administered by the **federal ministry of mines and power** now called **ministry of mines and steel development**. The administration of biological resources like forestry, wildlife, fisheries, livestock are the responsibility of the various departments in each state's **ministry of agriculture and natural resources**.

3.2 Concept of Management of Natural Resources.

Management of natural resources is the basic, integrating process or activities of what?. The essence of management of natural resources is because of the scarcity of resources used to

satisfy human wants. Management can be considered as a fundamental all encompassing process aimed to achieve organized purposeful results.

Natural resource management refers to the management of natural resources such as land, water, soil, plants and animals with a particular focus on how management affects the quality of life for both present and future generations.

Environmental management is also similar to natural resource management. Natural resources management deals with managing the way in which people and natural landscapes interact. It brings together land use planning, water management, biodiversity conservation and the future of the sustainability of industries like industries agriculture, mining, tourism, fisheries and forestry. It recognizes that people and their livelihoods rely on the health and productivity of our landscapes and their actions as stewards of the land play a critical role in maintaining this health and productivity.

Natural resources management specifically focuses on a scientific and technical understanding of resources and ecology and the life supporting capacity of those resources.

Environmental management is also similar to natural resources since natural resources also includes wildlife management often associated with ecotourism and rangeland management.

Natural resource management issues a times seem complex. They also involve the ecological cycle, hydrological cycles, climate, animals, plants and geography. All these are dynamic and inter related. A change in one of them may have far reaching and long term impacts which may even be irreversible.

In addition to the natural systems, natural resources management also includes the management of various stakeholders and their interests, policies, politics, geographical boundaries and economic implications.

Management of natural resources entails;

- a. Management of mineral or non biological resources and
- b. Management of biological resources.

The management of non biological resources is by the federal government. In this aspect, federal government directs and coordinates exploitation of mineral resources on behalf of the country. How about management of biological resources.

3.3 Ways of Managing Natural Resources

Natural resource management issues are inherently complex. They involve the ecological cycles, hydrological cycles, climate, animals, plants and geography. All these are dynamic and inter related. This is stated above

The various ways by which natural resources can be managed include:

- Top-down (command and control)
- Community-based natural resource management
- Adaptive management
- Precautionary approach
- Integrated natural resource management.

Community based natural resource management: The Community Based Natural Resource Management (CBNRM) approach combines conservation of objectives with the generation of economic benefits for rural communities. The key assumptions being that: locals are better placed to conserve natural resources. People will only conserve a resource if benefits exceed the costs of conservation. “All companies responsible for mining and exploitation activities must obtain permission from the federal government. The revenues accruing from them go to a central national purse. A certain percentage of this revenue is paid to the state in which particular mineral is found, another percentage set aside as ecological fund , while the remaining revenue and other revenues from other sectors of the economy are shared between the federal government and all the state government according to agreed revenue allocation formula” This was stated before.

Administration/management of petroleum and gas is under the auspices of the **federal ministry of petroleum resources**, while other mineral resources- gold, tin are administered by the **federal ministry of mines and power** now called **ministry of mines and steel development**. The administration of biological resources like forestry, wildlife, fisheries, livestock are the responsibility of the various departments in each state’s **ministry of agriculture and natural resources**(This was stated before).

For proper management, each resource is backed up by policy specifying the objectives and ways of managing them for sustainable production and people will conserve a resource that is linked directly to their quality of life, when a local people’s quality of life is enhanced, their efforts and commitment to ensure the future well being of the resource are also enhanced. Regional and community based natural resource management is also based on the principle of subsidiarity.

Adaptive management

The primary methodological approach adopted by catchment management authorities (CMAS) for regional natural resource management is adaptive management. This approach includes recognition that adaptation occurs through a process of “**plan – do – review act**”. It also recognizes seven key components that should be considered for quality natural resource management practice which include:

- a. Determination of scale
- b. Collection and use of knowledge
- c. Monitoring and evaluation
- d. Risk management
- e. Community engagement and
- f. Opportunities for collaboration

Where and which is the 7th key component

Integrated natural resource management

Integrated Natural Resource Management (NRM) is a process of managing natural resources in a systematic way, which includes multiple aspects of natural resource use (biophysical, socio-political, and economic) meet production goals of producers and other direct users (eg food security, profitability, risk aversion) as well as goals of the wider community (eg poverty alleviation, welfare of future generations, environmental conservation). It focus on sustainability and at the same time tries to incorporate all possible stakeholders from the planning level itself, reducing possible future conflicts. The conceptual basis of NRM has evolved in recent years through the convergence of research in diverse areas such as sustainable land use, participatory planning, integrated watershed management and adaptive management.

NRM is being used extensively and been successful in regional and community based natural management.

3.4 Challenges affecting administration and management of natural resources.

The haphazard use of the natural resources poses serious environmental threats particularly deforestation and forest degradation, biodiversity loss and ecosystem degradation, reduction in soil quality and fall in available water quality.

Furthermore, problems or challenges of natural resource management include discriminatory harvesting which poses great challenges/problems to natural resources since most of them are non renewable; hence means of conservation of non renewable resources is the non discriminatory harvesting of the resources in a particular site; atimes low grade minerals were abandoned because extraction of low grade deposits was uneconomical. Because of the scarcity of mineral deposits, miners are encouraged to remove both high and low grade deposits.

Other challenges affecting administration and management include:

1. Reduction and fragmentation of habitats and landscapes in expansion of human activities, into the natural environment manifested by urbanization, recreation, industrialization and agriculture; results in increasing uniformity in landscapes and consequential reduction, disappearance fragmentation or isolation of habitats and landscapes(Recast). The consequences are decreased species diversity to reduced habitable surface area which corresponds to a reduced species carrying capacity.
2. Reduction of the size of habitats also reduces the genetic diversity of the species living there. Smaller habitats can only accommodate smaller populations, which lead to impoverished gene pool. The reduction of genetic resources of a specie diminishes its flexibility and evolutionary adaptability to changing situations. This has significant negative impacts on natural resources.
3. Human intervention such as the construction of buildings, motorways or railways results in the fragmentation of habitats which strongly limits the possibility for contact or migration among them. In the extreme cases, even the smallest, narrowest connections between habitats are broken off. Such isolation is catastrophic for life in the habitat fragments.
4. Loss of species of fauna and flora. The biodiversity is affected by decreasing species numbers and loss of habitats in many regions. Approximately, 30% of the vertebrates and 20% of the higher plants are classified as threatened. Threats are directly linked to the loss of habitats due to destruction, modification and fragmentation of ecosystems as well as from overuse of pesticides and herbicides, intensive farming methods, hunting and general human disturbance.
5. Human behavior. Human behaviors have affected administration and management resources due to large family size, agricultural burning??, overconsumption of resources, failure to recycle, production/disposal of human wastes, improper disposal of human wastes or garbage, misuse of pesticides, overcrowding, economic dependence on growth, depletion of soils by overfarming, erosion from removal of vegetation, urban sprawl, overfishing, removal of carbon sinks, insufficient use of fuel, urbanizing farmland, urban growth where water is scarce and meat consumption .
6. Economic growth: As communities grow, so do natural resources decline. There is concern that unless natural resources use is checked, modern global civilization will affect the collapse of natural resources due to over exploitation of their resource base. While conventional economics

is concerned largely with economic growth and the efficient allocation of resources, ecological economics has the explicit goal of sustainable scale rather than continued growth, fair distribution and efficient allocation in that order. Sustainability studies have analyzed ways to reduce the amount of natural resources eg water, energy or materials needed for the production, consumption and disposal of a unit of good or service.

7. Land use: Loss of biodiversity stems largely from the habitat loss and fragmentation produced by the human appropriation of land for development, forestry and agriculture as natural capitals progressively being converted to man made capital. Land use change is fundamental to the operations of the biosphere because alterations in the relative proportions of land dedicated to urbanization, agriculture, forest, woodland, grassland and pasture have a marked effect on the global water, carbon and nitrogen biogeochemical cycles and these can impact relatively on both natural and human systems. At the local human scale, major sustainability benefits accrue from sustainable parks and gardens and green cities???

4.0 Conclusion

Administration and management of natural resources in this unit unfolds the definition of administration, management ways and problems affecting natural resources in terms of management and administration such as command and control methods of management.

5.0 Summary

In this unit, natural resources are defined as naturally occurring substances that are considered valuable in their relatively unmodified forms while administration is designed to foster orderly relationship and management is the integrating process of activities.

6.0 Tutor marked assignments

1. Explain the terms administration, management and natural resources.
2. Give some examples of natural resources

7.0 Reference for further studies

Barbier, E. (2007). *Natural resources and economic development*, Cambridge university press.

Collins P.H (2004). *Dictionary of the environment and ecology*, Bloomsbury publishing, 5th edition, London, WLD, 3HB.

Hunter, M.L.(1996). *Fundamentals of conservation biology. An evolutionary ecological perspective*. Sinauer associates, Sunderland, Massachusetes.

UNIT 2: RESOURCES ECONOMICS AND MANAGEMENT.

CONTENTS

1.0 Introduction

2.0 Objectives

3.0 Main content

3.1 Meaning of resource economics

3.2 Concept of resource economic management

3.3 Problems of resource economic management

3.4 Solution of resource economic management

4.0 Conclusion

5.0 Summary

6.0 Tutor marked assignments

7.0 References and further studies.

1.0 Introduction

In this introductory aspect, you will be familiar with the definitions of resource economics and management. You will also know the problems and solutions of resource economics and management.

2.0 Objective

At the end of this unit, you should be able to

- State the meaning of resource economics,
- Know the branches of resource economics,
- Importance and challenges of resource economics.

3.0 Meaning of Resource Economics

Resource economics are the factors used in producing goods or providing services. Economic resources can be divided into **human resources** such as labour and management and non human resources such as land, capital goods, financial resources and technology.

Importance of economic resources

An economy is a system of institutions and organization that either help facilitate or are directly involved in the production and distribution of goods and services. Economic resources are the inputs we use to produce and distribute goods and services. The precise proportion of each factor of production will vary from product to product and from service to service, and the goal is to make the most effective use of the resources that maximizes output at the least possible cost. Misallocation or improper use of resources may cause businesses and even entire economy to fall.

Revisit the meaning and importance of economic resources

Human resources

Labour is one of the classic factors of production along with land and capital, discussed by economics for well over a century. Even in today's technologically advanced world, human labour is still needed to help process resources to provide services. Different types of labour include- **production labour** and **service labour**. An example of production labour is the classic factory worker. Service labour include people involved in providing a service, such as doctors, lawyers, accountants, sales people, mechanics and plumbers.

Management is another example of a human resource. As organizations become more complex with the onset of industrial revolution, employees were required to oversee and manage the masses of workers engaged in the production process. Management is a resource that is used to facilitate efficient and effective production or operations of a business so that it can accomplish its goals. Rather than being directly involved in production or services, managers coordinates, monitor and direct employees engaged in the production or service. Examples of management include a direct supervisor all the way into the president of a company.

Non human resources

Land, like labour and capital is a classic factor of production. Land is all real estate and all natural resources on it, such as trees, minerals, elements, metals, gems and natural gas.

Furthermore, non human resources are external to the individual but possessed, utilized or controlled by family. These resources are very much essential for the achievement of goals and are limited in their availability. Non human resources include the personal possessions, family

possessions and the resources available to the individual with his or her community, state and nation.

Money is the purchasing power used to get other resources or achieve goals or attain satisfaction. It is important and major non human resources which has the power to purchase other resources and achieve desired goals. Community facilities are included in non human resources like parks, library, shopping and recreational facilities. The non human resources are directly controlled or utilized by the human beings.

Financial resources are a term covering all financial funds of the organization. From an economic perspective, financial resources are the parent of the organizations assets (property). Finance is one type of resource that is an input into production process. Sometimes, financial resources are referred just as finance, often with some attributes (such as business finance, personal finance).

Financial resources are structured as follows: cash, deposits with financial institutions and cash equivalents (securities, checks). Corporate capital- the sum of all money invested in the organization's total assets (equity capital +liability (foreign capital)).

Other financial resources are resources of funds creation and corporate capital (flow variable- the sum of inflow of money into the company for a certain period. Financial resources can also include cash in bank accounts, shares, bonds, debentures, promissory notes and cheques/checks.

Technology resources

Technology resources are information tools or devices that motivate students(only students) and give information or assistance with questions. An example of technology resources are interactive white boards, digital cameras and scanners. Every technological system makes less of seven types of resources, people, information, materials, tools and machines, energy, capital and time. Technology from the needs of people and people's needs drive technology.

Humans use what they know, try to learn more design and create technology using their knowledge and intelligence. People provide the labour on which technology depends, they are needed to provide the products and services we use everyday.

Technology requires information to solve problems and to create new knowledge. Information comes from raw data that is processed by collecting, recording, classifying, calculations, storming and relieving its information which can be found in many places such as in computer files and books, but is only useful when we make use of it. We process information by collecting it, thinking about it applying it to meet our needs and wants.

Raw materials

Natural resources found in nature are called raw materials. These include air, water, land, timber, minerals, plants and animals. Synthetic materials are manufactured materials that may have useful characteristics natural materials do not have??. There are two types of raw materials available for humans to use.

1. Renewable raw materials which are those that can be grown and therefore replaced. These include trees, animals, and plants.
2. Non renewable raw materials which are those that are used up and cannot be replaced such as oil, gas, coal and minerals.

The discussion on human, non-human, technology and raw materials are not linked with the importance of economic resources

3.2 Concept of Resource Economic Management

The focus should be on concept of resource economic management

Economic management is the management of resources, finances, income and expenditure of a community, business enterprise??. Economic management remains a serious problem in developing countries. BB

As human numbers increase and economic activity expands, demands on the natural environment grow more intensive and varied. Using any single resource for a particular purpose at a given date invariably involves trade offs. This can easily be cross sectoral or international. Likewise, the opportunity costs associated with the resources use are often intertemporal.

Managerial economics deals with the application of the economic concepts, theories, tools and methodologies to solve practical problems in business. In other words, managerial economics is the combination of **economic theory** and **management theory**. It helps the manager in decision making and acts as a link between theory and practice. It is sometimes referred to as business economics and is a branch of economics that applies microeconomic analysis to decision methods of business or other management units. It bridges economic theory and practice. It draws heavily from quantitative techniques such as regression analysis, correlation and calculus. The basis for management economics is to optimize business decisions given the firm's objective and the given constraints imposed by scarcity. For example, through the use of operations, researches, mathematical programming, game theory for strategic decisions and other computational methods.

Economic management is also the management of the resources, finances, income and expenditure of a community and business enterprise. Economic management remains a serious problem in developing countries. See BB above

Natural resource economic management also deals with supply, demand and allocation of the earth's natural resources. One main objective of natural resource economic management is to better understand the role of natural resources in the economy in order to develop more sustainable methods of managing those resources to ensure their availability to future generations.

Resource economists study interactions between economic and natural systems, with the goal of developing a sustainable and efficient economy.

Natural resource economic management aims to address the connections and interdependence between human economics and natural ecosystem. Its focus is how to operate an economy within the ecological constraints of earth's natural resources.

Resource economists bring together and connect different disciplines within the natural and social sciences connected to broad areas of earth science, human economics and natural ecosystems.

In terms of natural resource management, the policy areas focus on human aspects of environmental problems. Traditional areas of natural resource economics include welfare theory, land or location use, pollution control, resource extraction, non market valuation and resource exhaustibility, sustainability, environmental management and environmental policy.

Natural resource economic management also considers environmental impacts on agriculture, transportation and urbanization, land use in poor and industrialized countries, international trade and the environment, climate change and methodological advances in non market valuation. It also states that efficient exploitation of a non renewable and non augmentable resource would under stable economic conditions lead to a depletion of the resource.

Non augmentable resources of inorganic materials (ie minerals) are uncommon. Most resources are augmented by recycling and by the existence and use of substitute for the end use products.

3.3 Problems of natural resources economic management

The haphazard use of natural resource base challenges the sustainability of natural resources and poses serious environmental threats, particularly deforestation and forest degradation, biodiversity loss and ecosystem degradation, reduction in soil quality and fall in available water quantity. The decentralization and devolving of Natural Resource Management (NRM) responsibilities and benefits to local stakeholders are echoing strongly in many nations. The problem or challenges affecting natural resource economic management include acid rain, overfishing, urban sprawl, deforestation, water pollution, population growth, waste production, genetic modification of crops and environmental issues caused by man made chemicals.

Other problems affecting natural resource economic management include financial crises, followed by political chaos affecting socioeconomic and political settings, livelihood dependency, market pressure and climate change and its impact on local committee and the resources themselves.

Much of the improvement in living standard in developed and developing countries is attributable to the exploitation of the non renewable and renewable resources. The problem is to know when exploitation occurs, its rates and with technologies that are sustainable. If the technologies used are not sustainable, resource exploitation presents a serious problem for the future because welfare will decrease. A long term management perspective is needed to avoid irreversible degradation of renewable resource.

3.4 Solutions of Resource Economic Management

The challenges of resource economic management can be solved by making electricity use more efficient so that people will carry out their legitimate duties. Another solution is the use of more renewable energy, promote sustainable fishing rules, avoiding the use of plastics because of their problem of degradation, recycling more materials and improve recycling systems and reduction of food waste so as to reduce the pollution of the environment. Other solutions include;

More efficient use of electricity: Natural resources such as coal and natural gas are used to produce the electricity used in our homes, offices, stores and else where. We can conserve some of the electricity supply by turning things off and unplugging them when not in use and by using energy efficient appliances and light bulbs. Advanced technologies such as smart thermostat also help conserve energy by automatically turning appliances on and off as needed.

Use of more renewable energy: About 63% of our electricity comes from fossil fuels, which are natural resources that only replenish over an extremely long time. Resources like wind and sunlight however, can also be used to generate electricity, but these resources are renewable, that means once they are used, they become available again quickly. While using fossil fuels to generate electricity burns up finite resources, using renewable does not. Renewable energy also does not release green house gases which are causing climate change.

Promote sustainable fishing rules: One third of the world's fish populations are overexploited or severely depleted. Reduced fish population can alter entire ecosystem and hurt coastal economies that depend on fishing. Introducing new laws and ensuring existing ones stay in place can reduce overexploitation of these marine/coastal animals.

Avoid single use plastics: Reducing our plastics use help us avoid the use of the resources needed to make plastics and prevent plastic waste from harming the natural environment. Substituting single use plastics like plastic grocery bags, utensils and straws, with durable items can help.

Drive less: Gasoline is a product made from crude oil, a finite natural resource and fossil fuel. Car manufacturing also requires many different kinds of natural resources which include rubber and various metals. One can conserve natural resources by not owning a car??, owning a more fuel efficient car or driving less, walking, bicycling, taking public transportation and car pooling. These are all excellent alternatives to driving.

Recycle more and improve recycling systems: In addition to switching away from single use plastics, we can also recycle more to help with the plastic problem. Improving our recycling systems can also help. Researchers can find new, more efficient ways to recycle and the federal and state governments can help implement recycling programs including business outfits for their employees

.

Use sustainable agricultural practices: Agriculture is necessary but extremely resource intensive. There are however, ways to farm more sustainably. Rotating crops and planting cover crops help to keep the soil healthy. Using fewer chemicals and integrating biological pest control and natural fertilizers can help as well. Precision agriculture which uses technology to optimize resource use can help farmers use less fertilizer, pesticides, water and other inputs

.

Reduce food waste: Approximately a third of the food produced for human consumption every year gets wasted or lost because of all the resources required for growing, transporting and preparing the food are unavailable?? thereby causing huge losses. Keeping track of the food you have, planning meals and shopping trips ahead of time and properly storing food can help reduce food waste at home.

Promote sustainable forest management: Forests are full of natural resources. The ecosystem services they provide are approximately \$ 33 trillion annually, and about a quarter of the world's population depends on them to make a living. Yet, we are destroying forests faster than the earth can replenish them- at a rate of about 60 acres each minute. Sustainable forest management

practices can help prevent this. These practices mimic the natural destruction and regeneration pattern of nature and involve aspects such as establishing, protect areas, create a harvesting plan and using logging techniques that are easier on the natural environment.

Treatment of waste water before discharging: Water is crucial to survival, but more than 2 billion people do not have clean drinking water at home(source). Part of the reason for this is that some industrial plants especially in developing countries, discharge water into streams and rivers without adequately treating it. It is crucial that waste water discharge regulations are enforced if they exist and that they get introduced if they do not exist yet. Preventing natural resource depletion is vital for the environment, economy and health and wellbeing of the human population.

4.0 Conclusion

In this unit, you have learnt about resource economics and manageable. You also learnt about the types of resources economics which are human resources, non human resources, and technological resources. You also learnt about solutions of economic resource management

5.0 Summary

This unit clearly indicated that resource economics include human, non human and technological resources. You are also made to know that there exist renewable and non renewable resources

6.0 Tutor marked assignments

1. Differentiate between renewable and non renewable resources
- 2 Explain these terms, technological, renewable and non renewable resources.

7.0 References and further studies

Adams S. and David L. (2006): *Earth science: An illustrated guide to science*. New York, NY1001, Chelsea house.

Barbier, E. (2007). *Natural resources and economic development*, Cambridge university press.

Oldroyd, D. (2006). *Earth cycles. A historical perspective* ISBN 0-313-33229-0.???

UNIT 3: ENVIRONMENTAL CONSERVATION

CONTENTS

1.0 Introduction

2.0 Objectives

3.0 Main Content

3.1 Meaning / Concept of Environmental Conservation.

3.2 Methods of Environmental Conservation.

3.3 Problems of Environmental Conservation.

3.4 Solutions to Environmental Conservation.

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6.0 Tutor Marked Assignment.

7.0 References for Further Reading

1.0 Introduction

You will now be in a position to know the definition of environment conservation. You will also know the methods and problems of environmental conservation including solutions to those problems.

2.0 Objectives

At the end of this unit, you should be able to define:

- Environmental conservation.
- Know methods of environmental conservation.
- Learn the challenges affecting environmental conservation.

3.0 Main content

3.1 Meaning/ Concept of Environmental Conservation

Environmental Conservation is basically the practice of human beings to save the environment from collapsing, such as loss of species, ecosystems due to pollution and human activities. This helps both trees and animals since human beings are dependent on them to survive.

Environmental Conservation is also the practice of protecting the natural environment by individuals, organizations and governments. Its objectives are to conserve natural resources and the existing natural environment and where possible to repair damage and reverse trends. We need to save trees because they convert the Carbon IV oxide (CO₂) we produce from factories and supply human beings Oxygen (O₂) for us to breathe and respire.

Loss of species is another problem of what? This is not connected to meaning and concept of environmental management. If more and more species go into extinction then we would not be able to see them again, and will make it very hard for scientists to study them. Furthermore, it disrupts the food web and can disorganize the whole system as well. Due to the pressures of over consumption, population growth and technology, the biophysical environment is being degraded, sometimes permanently. This has been recognized and governments have begun placing restraints on activities that cause environmental degradation(The focus is meaning and concept of environmental management).

3.2 METHODS OF ENVIRONMENTAL CONSERVATION.

There are numerous ways in which environmental protection and conservation can be achieved. The methods include

i.Recycling:

Recycling is the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products. Recycle everything you can and try to buy reusable and biodegradable products as much as possible. Whether it is glass or paper, plastic or metal all these materials can be reused. Employ jars, Wine bottles, broken glasses and absolutely any other item made of glass which is no longer useful should be recycled for it takes a million years for glass to decompose. Also, old newspapers, paper wraps, cardboard, sheets of paper, paper container should be recycled. Plastic bags are not biodegradable either and they are used in large quantities every year. Reused containers and bags would be a healthy, environmental- protective alternative. Metal and tin scraps, used cans of all kinds, regardless of the metal they are made of, everything can be reused.

ii.Reduce??? Water Conservation.

Water is life. Clean, freshwater tends to become more and more precious as time goes by and if we do nothing to save it, in the not so far future, water will be more precious than gold. It is therefore, crucial for us to do whatever we can in order to save it and to prevent water pollution. Used oil or paint should not be discarded into the drains as they will pollute the rivers and finally the seas.

iii.Reduce the use of Electricity.

Once you are done with an electric appliance, turn it off. You will save not only energy but money from your electricity bill. Replace regular bulbs with energy saving light bulbs. Once you leave the office, physically turn off your computer and monitor. You will prolong their life and reduce electricity consumption in the process. It also should be done at home.

iv.Plant a tree.

Trees are our source of Oxygen and we cut them down instead of planting them. If every person planted a tree, life would improve significantly. The air would be cleaner, and more shade for the environment; pollution would be reduced along global warming and greenhouse effect.

v.Grow Vegetables.

Most vegetables we eat today are grown with chemicals and pesticides. If one plants his/her vegetables without using pesticides, there will be organic food of excellent quality , beneficial for both your health and environment as land will be less intoxicated with chemicals. Another benefit is organic vegetables are more tasty so not only are you becoming healthier, you will also get to taste delicious bursts of flavor.

vi.Composting

A few composting bins in the garden represents opportunity to avoid littering, at the same time being a reliable source of natural manure for your vegetables garden . Manure is not harmful for the environment and litter is reduced.

vii. Use of rechargeable batteries

Batteries are extremely dangerous for the environment and unfortunately, only a fraction of these batteries gets to be recycled. The rest is thrown away, becoming a hazardous enemy of the environment.

Quit Smoking.

It is needless to say how dangerous cigarettes are to your health .They are the cause of a large number of Lethal diseases. When people stub out cigarettes, many do not throw it in to a bin but on the ground which is just pure littering .In addition, they get to increase air pollution even more, affecting also those who do not smoke.

Car Maintenance.

Cars are very important source of pollution today and their number is increasing every year. It is important to maintain your car in good condition. A car that has not been serviced regularly might dispel even more chemical and harmful gases in the air just because one did not make time to have it checked. Regular maintenance will also increase performance of the car and less emission to the environment.

Wildlife conservation

Wildlife such as animals and birds can be protected. Usually, the wildlife is hunted for human consumption .In many areas, these wildlife have become nuisance particularly where the animals do not get the food to feed on. Hence, in areas where the nuisance is reported from such wandering troops of wildlife, arrangement for food could be made by the charitable organization and the forest department. There is also the need to control the group size of these troops as availability of food might result in growth of population increasing the nuisance.

3.3 PROBLEMS OF ENVIRONMENTAL CONSERVATION.

Major current environmental issues include climate changes, pollution, environmental degradation and resource depletion. Furthermore, there is need to conserve and protect endangered species and protection of any ecologically valuable natural areas, genetically modified foods and global warming.

Environmental issues are harmful effect of human activity on the biophysical environment. Environmental protection/ or conservation is a practice of protecting or conserving

the natural environment and humans. Environmentalism, a social and environmental movement, addresses environmental issues through advocacy, education and activism (This is not problem of environmental conservation).

The Carbon dioxide equivalent of greenhouse gas (GHG) in the atmosphere has already exceeded 400 parts per million with total “long term” GHG exceeding 455 parts per million). Climate diseases are on the rise around 70% of disasters are now climate related- flooding, pollution, erosion and water logging. These disasters take a heavier human toll and come with a higher price tag. In the last decade, 2.4 billion people were affected by climate related disasters. Destructive sudden heavy rains, intense tropical storms, repeated flooding and droughts are likely to increase as will the vulnerability of local communities in the absence of strong concentrated action. Environment destruction caused by humans is a global problem, and this is a problem that is ongoing everyday. The human effects on Earth can be seen in many different ways. A main one is the temperature rise, and according to the observation by “Our changing climate”, the global warming that has been going on for the past 50 years is primarily due to human activities.

Other Environmental Conservation problems include ozone depletion, Green house effect and Global warming. These also include Desertification, Deforestation, loss of Biodiversity and Disposal of wastes. Conservation problems also include Acid rain, Over fishing, Urban sprawl, Deforestation, Water pollution, population growth, waste production, and Genetic modification of crops, may leak chemical compounds into the soil through their roots possibly affecting communities of microorganisms.

Water pollution

Freshwater is crucial to life on Earth yet more sources are being polluted through human activities each year. On a global scale, 2 million tons of sewage, agricultural and industrial waste enters the world’s water everyday. Water pollution can have harmful effects outside of contamination of the water we drink. It also disrupts marine life, sometimes altering reproductive cycles and increasing mortality rate.

Deforestation

The demand of an increasing population has resulted in increasing levels of deforestation. Current estimates state that the planet is losing 80,000 acres of tropical forests per day. This results in loss of habits for many species, placing many at risk and leading to large scale extinction. Furthermore, deforestation is estimated to produce 15% of the world’s green house gas emission.

Urban Sprawl

The continual expansion of urban areas into traditionally rural regions is not without its problems. Urban Sprawl has been linked to environmental issues like air and water pollution increases, in addition to the creation of heat islands, Urban Sprawl continues to forest fragmentation which leads to larger deforestation.

Acid rain

Acid rain comes as a result of air pollution mostly through chemicals released into the environment when fuel is burnt. Its effects are mostly clearly seen in aquatic ecosystems where increasing acidity in the water can lead to animal deaths. It also causes various issues for trees. Acid rain weakens plants by damaging leaves poisoning trees and limiting their available nutrients.

Ozone layer depletion

Ozone depletion is caused by the release of chemicals primarily Chloride and Bromide into the atmosphere. A single atom of either has the potentials to destroy thousands of ozone molecules before leaving the stratospheres. Ozone depletion results in more UVB radiation reaching the Earth's surface. UVB has been linked to skin cancer and eye diseases plus it affects plant life and has been linked to a reduction of plankton in Marine environment.

Ocean acidification

It is the term used to describe the continued lowering of the pH levels of the Earth's oceans as a result of Carbon IV oxide [CO₂] emission. It is estimated the ocean acidity will increase by 15% by 21000 if efforts aren't made to halt it. This increase in acidification can have dive effect on calcifying species such as shellfish. This causes issues throughout the food chain and may lead to reductions in aquatic life by acidification.

Air pollution

Air pollution is becoming an increasingly dangerous problem, particularly in heavily-populated cities. The World Health Organization (WHO) has found that 80% of people living in urban areas are exposed to air quality levels deemed unfit by the organization. It is also directly linked to other environmental issues, such as acid rain and eutrophication. Animals and humans are also at risk of developing a number of health problems due to air pollution.

Lowered Biodiversity

Continued human activities and expansion has led to lowered biodiversity. A lack of biodiversity means that future generations will have to deal with increasing vulnerability of plants to pests and few sources of fresh water. Some studies have found that lowered biodiversity has as pronounced an impact as climate change and pollution on ecosystems practically in areas with higher amounts of species extinction.

Climate Change

The majority of the issues previously discussed are linked to climate change. Statistics created by National Aeronautics and Space Administration [NASA] stated that global temperatures have risen by 1.7 degrees Fahrenheit since 1880, which is directly linked to a reduction in Arctic ice of 13.3% per decade. The effects of climate are wide spreads as it will cause issues with deforestations, water supplies, oceans and Ecosystems. Each of these have wide spread implications of their own, marking climate change as the major environmental issue the planets faces today.

The issues discussed under 3.3 are not properly linked to problems of environmental conservation

3.4 Solutions to environmental conservation.

Use Reusable Bags

Plastic grocery-type bags that get thrown end up in land fill or in other parts of the environment. These can suffocate animals who get stuck in them or may mistake them for food. Also it takes a while for the bags to decompose. Whether you are shopping for food, clothes or books, use a reusable bag. This cuts down on getting a hold of them.

Recycle

Recycling is such a simple thing to do, but so many people don't do it. Many garbage disposal companies offer recycling services, it is done simply by getting a bin and putting it out with your trash cans. Another way to recycle is to look for recycling cans near trash cans. Instead of trash with your non recyclables, make a point to take an extra step to locate recycling cans around any vicinity.

Use a reusable beverages container

Instead of buying individually packaged drinks, consider buying a bulk container of the beverage you want and buying a reusable water bottle. Not only will this help the environment, but it will also help you save money since you are buying a bulk container.

Save electricity

Use energy efficient bulbs, they last longer, which will save you a bit of money (every little bit helps your budgets). Turn off lights, T V and other appliances when not in use lower your air conditioning or heater when it is necessary. Open your windows when the weather is cool, this will help conserve the environment.

Save water

Water is wasted more frequently than we can see. Turn off the faucet as you are brushing your teeth. Don't turn your shower on until you are ready to get in usage as your hair .Limit your water usage as you wash dishes. Changing old habits will be good for both the environment and your wallet.

Avoid Taking Cars or Car pool when possible

Cars are harmful to the environment. Taking public transportation, walking or riding a bike to places are better options that help the environment and your budgets as well as getting some exercise in.

Remove chemicals from inside outside the house, use eco- friendly pesticides and herbicides that won't contaminate ground water. Consider signing up for a renewable energy producer that uses 100% renewable energy to power homes.

IMPORTANCE OF ENVIRONMENTAL CONSERVATION

Environmental conservation is important for many reasons, including protecting the ozone layer, maintaining animal and human food chains, preserving potable water and making efficient use of non- renewable resources .

Environment conservation seeks to prevent dormant damage through measures such as proactive management and ecologically sustainable energy production.

All environmental conservation benefits the human kind; for example preserving the ozone layer reduces the amount of ultraviolet radiation that reaches the surface .Ultraviolet radiation contributes to rapid aging and skin cancer. It also causes rapid sun burns.

Food chain preservation is another conservation focus area. Damage to a small or seemingly insignificant ecosystem often has deleterious effects on many others, for example, if industrial runoff upsets algae growth, it also impacts the creatures that rely on the algae for food. This in turn affects the natural predators of the algae eaters, before long, the entire food chain incurs hardship.

Fossil fuels are another issue of great interest to environmental conservationists. Oil and natural gas are the overwhelming dominant sources of energy throughout the world. They are non-renewable and generate high levels of pollution. Harvesting fossil fuels is often dangerous for the surrounding ecosystems, for example, oil pipelines often destroy important animal habitats. In the event of malfunction or accident, submarine oil drilling and transportation also pose significant threats to marine animals and the overall aquatic environment. Consider every part of the environment including the trees, the oceans and the soil. The trees that helps to breathe also isolate green house gases that would cause the Earth to heat up more quickly .They hold the soil in place and naturally filter water that has been absorbed into the ground.

The water of the ocean which are also components of the environment are very important to us . They are home to countless types of marine life and plants.

4.0 Conclusion.

Knowledge of environmental conservation in this unit unfolds the definitions, methods, problems and solutions of environmental conservation.

5.0 Summary.

In this unit, environmental conservation is defined as basically the practice of human beings to save the environment from collapsing such as loss of species, ecosystem due to pollution and human activities. It is also a concept of protecting natural environments by human beings, government and organizations. Biophysical environment is also being degraded by environmental pollution and waste disposals.

6.0 Tutor Marked Assignments.

- i.Explain the terms, environmental conservation, biophysical environment, and recycling.
- ii.State briefly some problems of environmental conservation.

7.0 References and Further Studies.

Adams, S. and David L (2006) *Earth science: An illustrated guide to science*. New York: Chelsea, House.

Barbier E (1987). The Concept of sustainable Economic Development, *Environmental Conservation*. 14(2) : 101-110

Eberlee, J.(1999). Alternative approaches to managing conflict over natural resources. IDRC Reports, 278 pp1-5.

Oldroyd, D. (2006). *Earth Cycles: A historical perspective*. Westport: Greenwood press.

UNIT 4: PROTECTION OF NATURE AND CONSERVATION OF SPECIES.

CONTENTS

1.0 Introduction

2.0 Objectives

3.0 Main Content.

3.1 Concept/ Meaning / Definition of Protection of Nature

3.2 Concept/ Meaning /Definition of Conservation of Species

3.3 Ways of Conserving / Protecting Nature / Species (Natural Species)

3.4 Challenges/ Problems of Conserving Natural Species.

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignments

7.0 References/ Further Studies

1.0 Introduction.

It will now be possible to know the concept of the protection of nature. You will also know ways of conservation of Natural Species including the problems of conservation of natural species.

2.0 Objectives

At the end of this unit, you will be in a position to:

- Define Natural species, and protection of Nature.
- You will also know ways of preservation of Natural species.

3.1 Concept/ Meaning /Definition of Protection of Natural Species

The term – Protection of Nature may be defined as the preservation of the entire world biotic community or man’s natural environment , which includes the Earth’s renewable natural resources of which it is composed , and on which rest the foundation of human civilization. Furthermore, natural protection is also the practice of protecting the natural environment by individuals, organizations and governments. Its objectives are to conserve natural resources and the existing natural environment and where possible, to repair damage and reverse trends.

3.2 Concept/ Meaning / Definition of Conservation of Species.

Conservation of species is also an activity in which people make conscious efforts to protect earth’s biological diversity. Wildlife conservation is the practice of protection wild species and their habitats in order to prevent species from going extinct. Wildlife conservation activities relate to the protection of plants, and animal species and their habitats. In U.S, there are Legislations that aim to conserve wildlife and endangered species.(Say something about wildlife conservation in Nigeria .Major threats to wildlife include habitat destruction / degradation / fragmentation, exploitation, poaching, pollution and climate change.

..

3.3 Ways of Conserving/ Protecting Natural Species.

Natural species can be conserved / protected through:

- Giving protection to animals and plants species or special areas of land or water.
- **Restoration:** To restore unsightly countryside [e.g waste tips and slag heaps] .
- **Rewilding:** Allowing areas to restore themselves naturally without interference by humans [except possible species reintroductions].

- **Alternative Energy:** A need to find alternative resources to replace coal and oil.
- **Natural Reserves and Zoos:** Are of special value in preserving rare species.
- **Recycling:** Reprocessing of unwanted products (eg newspapers, scrap metals, glass and sewage).
- **Education:** Making more people aware of the need to protect and preserve the environment through schools, community ,Religious and youth organizations and the media.
- **Donation:** When you visit your local accreditate zoos and nature reserves, pay the recommended entry fee. Your donations can help maintain these vital conservation areas.
- **Speck Up:** Share your passion for wildlife conservation with your family. Tell your friends how they can help. Ask everyone you know to pledge to do what they can to stop **wildlife trafficking**.
- **Buy Responsibly:** By not purchasing products made from endangered animals or their parts, you can stop wildlife trafficking from being a profitable enterprise.
- **Pitch In:** Trash isn't just ugly, its harmful .Birds and other animals can trap their heads in plastic rings. Fish can get stuck in nets. Plus, trash pollutes everyone's natural resources. Do your part by putting trash in its place.
- **Restore:** Habitat destruction is the main threat to 85 % of all threatened and endangered species, according to the International Union for Conservation of Nature. You can help reduce this threat by planting native trees, restoring wetlands or cleaning up beaches in your area.
- **Join:** Whether you are into protecting natural habitats or preventing natural wildlife trafficking, find the organization that speaks to your passion and get involved. Become a member .Stay informed. Actively support the organization of your choice.

3.4 Challenges / Problems of Conserving Natural Species.

The challenges / problems of conserving natural species are-

(1) **Habitat loss:** Habitat loss poses arguably the greatest threat to the world's biodiversity, with human activity unprecedented changes on the natural habitats on which wildlife depends

(2) **Illegal wildlife trade** Illegal wildlife trade has become a high profile issue receiving global media attention, not least because of the devastating effects on populations of rhinos, elephants and other charismatic wildlife.

(3) **Ocean plastic pollution:** Plastic is accumulating in the world's oceans at a staggering rate. An estimated eight million tons of plastic are swept into our seas and, posing a severe risk to marine life.

(4) **Climate change:** Climate change is recognized as one of the biggest threats to our natural world and its biodiversity, as well as to global security, human health and well being..

(5) **People and the environment:** Humans are inextricably linked to the environmental landscape within which our daily lives unfold. We depend completely on nature for a stable climate, clean air and water, and food.

4.0 Conclusion

In this unit, you have learnt about protection of nature and conservation of species. You also learnt that Natural species can be conserved through restoration, rewilding, and the utilization of alternative energy.

5.0 Summary

This unit has clearly indicated the concept of the protection and conservation of natural species. You are also made to know that natural species can be protected by recycling, donation, speak up and pitch in.

6.0 Tutor Marked Assignments.

Explain briefly the problems of conserving natural species.

7.0 References and Further Studies.

Bisong, E . F and Ajake E (2001) "Solid Waste Management for Sustainable rural development in Bisong ,E .F. (ed) : ,Lagos : BAAS International Company.

Cairns, J. and Bidwell, J.R(1996) "Discontinuities in Technological and natural systems caused by exotic species. *Biodiversity Conservation*. . 5, 1085-1094.

Mielsen, N.O (1999): The meaning of health". *Ecosystem Health*. 5(6),5-?

MODULE 4: CONSERVATION OF AGRICULTURAL LANDSCAPE

Unit 1: Definition of Agricultural Landscape

Unit 2: Balanced Approach to Natural Resources Management

Unit 3: Development of planning and management principles of Natural Resources

Unit 4: Development Increase of Ecosystem Processes

Unit 1: DEFINITIONS OF AGRICULTURAL LANDSCAPE

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3.1 Definition of Agricultural Landscapes

3.2 Types of Agricultural Landscapes

3.3 Management of Agricultural Landscapes

3.4 Problems/ Challenges in Managing Agricultural landscapes

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignments

7.0 References and Further Reading

1.0 INTRODUCTION

You can now know the definitions of Agricultural landscapes. You will also know the types of Agricultural landscape, management and problems affecting Agricultural landscapes.

2.0 OBJECTIVES

At the end of this unit, you should be able to define Agricultural landscape, know the problems of agricultural landscapes and the management procedures for agricultural landscapes.

3.0 MAIN CONTENT

3.1 DEFINITION OF AGRICULTURAL LANDSCAPE

Agricultural landscapes are defined as the visual result of land uses and management systems in an area (Kizos and Koulouri, 2005). Agricultural landscapes are the result of interactions between farming activities and the natural setting in an area. .

3.2 TYPES OF AGRICULTURAL LANDSCAPES

Most agricultural landscapes are a mosaic of farmers' fields, semi-natural habitats, human infrastructures (examples roads) and occasional natural habitats. Within such landscapes, linear semi natural habitats often define the edges of agricultural fields. Landscapes include forests and agric? forest. Others are agric cash crops. Urban and Sub Urban landscapes are types of landscapes. Other landscape types include heterogeneous landscapes dominated by agricultural and forested areas. Forested landscapes prevail in regions with steeper slopes, higher elevations and soils with poor potential for agriculture. Landscapes also include Agric-dairy landscapes. Forest habitat was the most important habitat class in the Agric-forest and forest landscape types and urban areas and wetlands dominated the urban and sub-urban and wetlands with forest-agric landscape types respectively.

Furthermore, dairy farming constituted the predominant agricultural activity in the Agric-forest type of landscape.(Avoid a sentence paragraph)

3.3 Management of Agricultural Landscape

Introduce the reader to what is management of agricultural landscape

Agricultural landscapes can be managed using integrated management process which uses multiple objectives related to agricultural production, ecosystem conservation and sustainable natural resource management.

Integrated landscape management (ILM) is synonymous with landscape or ecosystem management at scale.

Furthermore, integrated landscape management is the management of production systems and natural resources in an area large enough to produce vital ecosystem services and small enough to be managed by the people using the land and producing those services.

Integrated landscape management involves long term collaboration among different groups of land managers and stakeholders to achieve their multiple objectives and expectations within the landscape for local livelihoods, health and well-being.

3.4 Problems/ Challenges in Managing Agricultural Landscapes

Agricultural lands are under pressure due to scarcity of land and high population explosion all over the world. Pressure is increasing globally to increase agricultural production including bioenergy per unit area, provide ecosystem services such as carbon sequestration, flood control and maintain cultural and biodiverse landscapes. These functions should not be totally separated, rather we need to develop agricultural systems and landscapes that also provide these services; though the balance between them will vary from place to place. Such systems must be productive, resilient and profitable, raising the issue of how public benefits of ecosystem services are valued and captured. While many agricultural landscapes will change, there is real scope to develop systems that are both productive and biodiverse.

The role agriculture plays in our economy is changing. The former preference for production is being replaced by a preference for the production of landscape. The problem facing agriculture and landscape is how to preserve the character of the rural landscape, which is closely connected with agricultural activity, under conditions of decreasing agricultural production. This question is extremely important in marginal areas whose economy is based on agriculture. Declining agricultural production in these areas results not only in social changes but also in changes in the landscape patterns of environmentally valuable areas.

One possible solution to this problem is a policy of landscape management and this can be done by implementing new types of subsidies in agricultural policy to encourage sustainable landscape management.

Furthermore, changes in climate and agricultural practices are putting pressure on agro-environmental systems all over the world. Agricultural systems all over the world are undergoing pervasive changes in climate and land use land cover. In addition to changing crop choice, farmers have modified tillage operations, fertilizer application, artificial drainage and

conservation practices normally called land use land cover to optimize production. Climate change has also strongly influenced these systems. For example, warmer temperatures and altered timing frequency- magnitude of storms on top of land use land cover change have significantly altered the water, sediment, carbon and nutrient dynamics in their landscapes, adversely impacting the quality and ecological integrity of the receiving water.

Understanding and predicting the interactions between the atmosphere, land surface, water systems, built environment and ecosystem function and services is one of the greatest challenges.

Furthermore, it is difficult and likely unsustainable to attempt to implement large-scale changes in policy and management without adequate understanding and acceptance by individual land owners whose day to day actions contribute to or help prevent environmental and ecological degradation. The pressures of agricultural change may be reduced by minimizing permanent loss of large habitats, minimizing permanent loss of agricultural land, maintaining habitat diversity in agricultural landscapes in order to provide ecosystems services and minimizing pollution from nutrients and pesticides from the crops themselves.

1.0 Conclusion

Conservation of agricultural landscapes in this unit unfolds the definition of agricultural landscapes, types of agricultural landscapes, management and problems affecting agricultural landscapes.

2.0 Summary

In this unit, agricultural landscapes are referred to as the visual result of land uses and management systems in an area. Agricultural landscapes include mosaic of farmers' fields, semi-natural habitats and human infrastructure. Landscapes also include forests and agricultural forests.

3.0 Tutor Marked Assignment

- i. Explain the terms natural habitats, landscapes and Sub urban landscapes.
- ii. Explain briefly integrated landscape management.

4.0 Reference and Further Reading

(1) Carruthers, J. (2004) *Africa: Histories, Ecologies and Societies. Environment and History*. 10 pp. 379-406.

(2)Eric L.J. (1991). The history of Natural Resources Exploitation in the Western World. Research in Economic History, Supplement 6. Pp. 235-252.

(3)Global Environmental Change (1995): Human and Policy Implications. Issue on People, Land Management and Environmental Change vol. 3 No. 4

(4)UNFCC (2009). "United Nations Framework Convention on Climate Change.

UNIT 2: BALANCED APPROACH TO RESOURCES MANAGEMENT

1.0 Introduction

2.0 Objective

3.0 Main Content

3.1 Definition of Balanced Approach to Natural Resources Management

3.2 Types of Approaches to Natural Resources Management

3.3 Problems of Balanced Approaches to Natural Resources Management

3.4 Solutions to Balanced Approaches to Natural Resources Management

4.0 Conclusion

5.0 Summary

6.0 Tutor marked Assignments

7.0 References for Further Reading

Unit 2: BALANCED APPROACH TO NATURAL RESOURCES MANAGEMENT.

1.0 INTRODUCTION

In this, you will know the definition of balanced approach to natural resources management. You will also know types of approaches to natural resource management, problems and solutions to balanced approaches to natural resource management.

2.0 OBJECTIVES

At the end of this unit, you should be able to define resources management, know the problems of balanced approach to resources management.

3.0 MAIN CONTENTS

3.1 DEFINITION OF BALANCED APPROACH TO NATURAL RESOURCES MANAGEMENT

Natural resources are classified as potential, actual, reserve or stock resources based on their stages of development. Natural resources are either renewable or non renewable depending on whether or not they replenish naturally. Natural resource utilization is regulated through the use of taxes and permits.

Natural resources management refers to the management of natural resources such as land, water, soil, plants and animals with a particular focus on how management affects the quality of life of both present and future generations.

Natural resources management deals with managing the way in which people and natural landscapes interact. It brings together land use planning, water management, biodiversity conservation and the future sustainability of industries like agriculture, mining, tourism, fisheries and forestry. It recognizes that people and their livelihoods rely on the health and productivity of our landscapes and their actions as well as stewards of the land pay a critical role in maintaining health and productivity. . Natural resources management focuses on scientific and technical understanding of resources and ecology and the life supporting capacity of those resources. Environmental management is also similar to natural resource management.

3.2 Types of Approaches to Natural Resources Management

The various approaches applied to natural resource management include:

- Top-down (command and control)
- Community based natural resource management
- Adaptive management
- Precautionary approach
- Integrated natural resource management

Furthermore, natural resource management issues are inherently complex. They involve the ecological cycles, hydrological cycles, climate animals, plants and geography. All these are dynamic and inter-related. A change in one of them may have effect on the other. In community based natural resources management, the approach combines conservation objectives with the generation of economic benefits for rural communities. In this aspect, it is assumed that locals are better placed to conserve natural resources as far as it is linked to their quality of life. When a local people's quality of life is enhanced, their efforts and commitments to ensure the future well being of the resources are also enhanced. Is this types of approaches to natural resource management??

*Adaptive Management Approach

The approach includes recognition that adaption occurs through a process of “plan-do-review act”. It also recognizes some key components for quality natural resource natural management such as: determination of scale, collection and use of knowledge; information management, monitoring and evaluation, risk management, community engagement and opportunities for collaboration.

*Integrated Natural Resource Management-

Is a process of managing natural resources in a systematic way, which includes multiple aspects of natural use (biophysical, socio-political and economic) to meet production goals of producers and users for example, food security, poverty alleviation and environmental conservation. It focuses on sustainability and tries to incorporate all possible stakeholders from the planning level, completion level. It also focuses on sustainability.

- You have not discussed Top-down (command and control), Precautionary approach Integrated natural resource management and Community based natural resource management as listed in 3.2 above.

Maximum Sustainable Yield Approach: This approach explains the relationship between the rate of growth and the level of population of a renewable resource.

*Natural Resource Scarcity Approach: In this aspect, classical economists express their arguments on natural resources scarcity.

*Ecological Approach: In this aspect, it is believed that there are no substitutes for many natural resources such as air, water, fertile soil and bio-diversity.

Note: List the approaches and explain each

3.3 Problems of Balanced Approaches to Natural Resource Management.

Problems of Natural Resources Management are:

(1) Shortage of Capital: Adequate capital is needed to manage the existing natural resources

(2) Shortage of Technical Know-how: The development and management of natural resources need adequate skilled manpower of varied levels.

(3) Lack of Infrastructure: Problems of infrastructure affect natural resources management. Most times, sites for executing natural resources lie in remote areas, which do not possess adequate facilities of transporting heavy equipment for the transportation of natural resources.

(4) Limited market where products of natural resources cannot be disposed of easily.

(5) Inappropriate government policy, unemployment and political instability.

The haphazard use of the natural resource base also challenges the sustainability of natural resources and poses serious environmental threats particularly deforestation and forest degradation, biodiversity loss and ecosystem degradation, reduction in soil quality and fall in available water quantity (link to problem of natural resource management).

Natural resources exploitation, exploration, mining and processing have caused different types of environmental damages which include ecological disturbances, destruction of flora and fauna, pollution of air, water and land, instability of soil and rock masses, landscape degradation, desertification and global warming. (link to problems of natural resources management)

3.4 Solution to Balanced approaches to Natural Resources Management s

Solutions to the Management of Natural Resources???

Natural Resources Management refers to the sustainable utilization of major natural resources such as land, water, air, minerals, forests, fisheries and wild flora and fauna. Together, these resources provide the ecosystem services that provide better quality to human life. Natural resources provide fundamental life support, in the form of both consumptive and public good services. Ecological processes maintain soil productivity, nutrient recycling, the cleansing of air and water and climatic cycles. Is this **Solution to Balanced approaches to Natural Resources Management OR Problems**

Biological diversity (biodiversity) is the occurrence of different types of ecosystems, different species of organisms with the whole range of their variants and genes adapted to different climates and environments along with their interactions and processes. Ecosystem diversity describes the assemblage and interaction of species living together and the physical environment in a given area. It is referred to as landscape diversity because it includes placement and size of various ecosystems. Is this **Solution to Balanced approaches to Natural Resources Management OR Problems**

List the suggestions/solutions and explain each

In natural resource management, Laser technology can be used to measure ground slope, vertical and horizontal distances and diameters and heights of trees for forestry and natural resource management and even location of trees within plots.

Calipers have also been developed to measure diameters of trees without touching the trees physically.

Remote Sensing technique also helps to determine the characteristics of landscape or vegetative features.

Sub canopy vegetation height can also be estimated using this technology.

GIS and Satellite- based positioning systems can also provide opportunities for precise and efficient forest and natural resource data collection efforts.

Furthermore, Natural Resource Management refers to the management of natural resources such as land, water, soil, plants and animals with a particular focus on how management affects the quality of life for both present and future generations. Is this **Solution to Balanced approaches to Natural Resources Management OR Problems**

Natural Resource Management deals with managing the way in which people and natural landscapes interact. It brings together land use planning, water management, biodiversity conservation and the future sustainability of industries like agriculture, mining, tourism, fisheries and forestry. Is this **Solution to Balanced approaches to Natural Resources Management OR Problems**

Natural Resource Management also focuses on a scientific and technical understanding of resources and ecology and life supporting capacity of those resources???.???

Biodiversity conservation is also an important element in natural resource management. Biodiversity is a comprehensive concept which is a description of the extent of natural diversity?????.

Precautionary Biodiversity Management?????

The threats causing havoc on biodiversity include habitat fragmentation, putting a strain on the already stretched biological resources, forest deterioration and deforestation, the invasion of “alien species” and climate change since these threats have received attention from environmentalists and the public, the precautionary management of biodiversity becomes an important part of natural resources management.

Natural resources can also be taken care of using Ecosystem –based management, Adaptive management, Environmental Impact assessment and protectionist approaches which links to biodiversity conservation in natural resources management.

4.0 Conclusion

In this unit, you have learnt the definition of balanced approach to natural resources. You also learnt that there are problems affecting resources management such as shortage of capital, f technical knowhow and infrastructure. We also know that such problems can be solved by appropriate utilization of natural resources.

5.0 Summary

This unit has clearly indicated that resources management deals with managing the way in which people and natural landscapes interact. It brings together land use planning, water management and biodiversity conservation.

6.0 Tutor Marked Assignment

- (1) Define the term, resource management
- (2) What are the problems affecting resources management
- (3) State how such problems can be solved

7.0 References and Further Reading

Bethinge F, and Pete, D. eds (2017). *Forest management and planning* (2nd ed) Academic press p.362.

Hubert K, Wayne A and Michael C; eds. (2010), *Inland Fisheries Management in North America* 3rd ed.) Bethesda, Md, American Fisheries Society p.736.

Thakadu, O.T. (2005) “Success factors in community based natural resources management in Northern Botswana. *Natural Resources Forum* 29 (3), 199-212

UNIT 3: PLANNING AND MANAGEMENT PRINCIPLES OF NATURAL RESOURCES

CONTENTS

1.0 Introduction

2.0 Objectives

3.0 Main Content

3.1 Concepts of Planning and Management of Natural Resources

3.2 Types of Management of Natural Resources

3.3 Problems of Planning and Management of Natural Resources

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignment

7.0 References and Further Reading

UNIT 3: PLANNING AND MANAGEMENT PRINCIPLES OF NATURAL RESOURCES

1.0 Introduction

One can now know the basic definitions of development, planning, management and natural resources. You can also identify types and problems of natural resources management. This is not introduction to the issue to be discussed

2.0 Objectives

At the end of this unit, you should be able to explain the concept of planning and management of natural resources. You can identify types of management of natural resources and proffer solutions to the problems of natural resources management.

3.0 Main Content

3.1 CONCEPT OF PLANNING AND MANAGEMENT OF NATURAL RESOURCES

Natural resource management planning involves the development of detailed plan for managing natural resources within a particular area or project site. This also involves protection of environmental resources with community goals. These community goals could include economic development, improved government efficiency and enhanced quality of life. This involves land use planning, downtown revitalization and environmental management. It also involves identifying strategic uses of natural resources in eco-tourism and community development.

Natural resource management refers to the management of natural resources such as land, water, soil, plants and animals with a particular focus on how management affects the quality of life for both present and future generations(So much said about this in the course).

Planning and management of natural resources is important to maintain a balance in the ecosystem to avoid further destruction of the environment, to avoid over consumption of natural resources, hence planning and managing of natural resources refers to the plan of action related to renewable and non renewable resources. .

3.2 Types of Management of Natural Resources

Types of resource management include:

(1) Forest Resource Management:

(Move to section that discussed forest resources). Forests can be conserved or managed through afforestation, reduce forest burning, discouraged use of fuel wood ,indiscriminate felling of trees, shifting cultivation should be reduced and enforcement of protection of wildlife .

(2) Water Resource Management:

(Move to the unit that discussed water as a resource). The management of water means making the best use of water resources available for human benefits. Water should be conserved by creating awareness regarding the importance of water and unnecessary wastage. Steps should be taken for the harvesting and storage of rooftop rain water. There should be controlling measures to check flood and improper use of water.

Qualitative degradation should be avoided.???

Steps should be taken to check pollution of water resources???

(3) Mineral Resource Management:

Minerals are non-renewal resources obtained from earth crust by the process of mining. Coupled with population explosion, rapid individualization and technological growth have put tremendous pressure on mineral resources. Preservation should be done by utilizing minerals in best possible way to satisfy the needs of industries and human beings and this should be done by using suitable methodology of mining for extraction of maximum possible amount of minerals.

The method selected should be ecofriendly.

(4) Land Resource Management:

Soil is a very important natural resource for all living organisms. All the nutrient requirements of plants are obtained from the layer of the soil. Due to over exploitation of top soil by the processes like deforestation, overgrazing, unplanned urbanization, the fertile soil is lost either by water or by air. The soil should therefore be protected from the impacts of rain by growing vegetation cover throughout the year. The wind velocity should be minimized by massive afforestation and social forestry in order to avoid direct contact between soil and eroding agents.

3.3 PROBLEMS OF PLANNING AND MANAGEMENT OF NATURAL RESOURCES

These include shortage of capital, shortage of technical know-how, inadequate infrastructure, limited market, inappropriate government policy, unemployment and political instability.

Furthermore, natural resources are not limitless and the following consequences can arise from the careless and excessive consumption of these resources You referring to lack of planning and management of natural resources?: Deforestation, Desertification, Extinction of species, Forced Migration, Soil erosion, Oil depletion, Ozone depletion, Greenhouse gas increase, Extreme energy, Water pollution, Natural hazard/ Natural disaster.Link this problems of planning and management of natural resources

The discussion under 3.3 is too brief

3.4 Solutions of Planning and Management of Natural Resources Problems?? Recast

Land Management constitutes solution to the planning and management of Natural Resources. In order to have a sustainable environment, understanding and using appropriate management strategies is important. Land management(Why only land? Is land the only natural Resource?) techniques to be used are:

- Comprehending the processes of nature including ecosystem, water, soils.
- Using appropriate and adapting management systems in local situations.
- Cooperation between scientists who have knowledge and resources and local people who have knowledge and skills.
- These ameliorative measures also involve:Which ameliorative measures?
- Examination of local decisions in a regional context and the effects on natural resources.
- Plan for long-term change and unexpected events.
- Preserve rare landscape elements and associated species
- Avoid land uses that deplete natural resources

- Retain large contiguous or corrected areas that contain critical habitats.
- Minimize the introduction and spread of non native species.
- Avoid or compensate for the effects of development on ecological processes.
- Implementing land use and land management practices that are compatible with the natural potential of the area.

Note: Revisit 3.4 by listing the solutions with brief explanation of each

4.0 Conclusion

In this unit, you have learnt the definitions of balanced approaches to natural resources management; types of natural resources management, problems of natural resources management which included shortage of capital, limited market and inadequate government policy and solutions to natural resources management.

5.0 Summary

This unit has clearly shown that natural resources management involves detailed plan for managing natural resources within a particular area or project site. This also involves protection of environmental resources with community goals. We also know the types of natural resource management

6.0 Tutor Marked Assignment

- (1) Define the term resource management and the benefits of forest resources
- (2) Explain briefly the importance of afforestation

7.0 References and Further Reading

Bettinger, P, Boston, K and Kevin J.(2017). *Forest Management and Planning* (2nd ed). Academic Press p.362.

Cronin K, Richard E.F. (2009). *“Natural Resources and the Development – Environment Dilemma. “Exploiting Natural Resources.* The Henry L. Stimson Centre p. 63.

Mc Nicoll J and Geoffrey L. (2007) *“Population and sustainability. A handbook of Sustainable Development.* Edward Elgar Publishing. Pp. 39-125.

Thakadu, O.T. (2005) “Success factors in Community based natural resources management in Northern Botswana: Lessons from practice” *Natural Resources Forum.*,29 (3) 199-212.

Weber- Fahn, M and Strongman, J. (2012) “Mining and poverty reduction. Noord International WBPRSP.

UNIT 4: DEVELOPMENTAL INCREASE OF ECOSYSTEM PROCESSES

CONTENTS

1.0 Introduction

2.0 Objective

3.0 Main Content

3.1 Definition of Ecosystem

3.2 Types of Ecosystem Processes

3.3 Challenges/ Problems of the development (Increases of) Ecosystem processes

3.4 Solution to problems of Ecosystem processes

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignment

7.0 References and Further Reading

1.0 Introduction

You can now know the meaning of ecosystem, types of ecosystem process, challenges and solutions to the problem of Ecosystem processes.

2.Objective

At the end of this unit, you should be able to define developmental increase, ecosystem processes and types of ecosystems and their importance.

3.0 Main Content

3.1 DEFINITION OF ECOSYSTEM

Ecosystem is a biological community of interacting organisms and their physical environment. Ecosystem is also a community of living organisms in conjunction with the non living components of their environment, interacting as a system. These biotic and abiotic components are linked together through nutrient cycles and energy flows. An ecosystem is also a large community of living organisms (plants, animals and microbes) in a particular area. The living and physical components are linked together through nutrient cycles and energy flows. Ecosystems are of any size, but usually they are in particular places.

Examples of ecosystems are: agro ecosystem, aquatic ecosystem, coral reef, desert, forest, human ecosystem, Littoral zone, marine ecosystem, prairie, rainforest, savanna, steppe, taiga, tundra and urban ecosystem.

There are artificial, terrestrial, lentic and lotic what//. Ecosystems are parts of biomes which are climatic systems of life and organisms.

3.2 Types of Ecosystem Processes

List the types of ecosystem processes and explain each in this section.

The four fundamental ecological processes of ecosystems are the water cycle, biogeochemical (or nutrient) cycling, energy flow and community dynamics that is how the composition and structure of an ecosystem changes following disturbance (succession).

Water Cycle- Water (H_2O) is the most abundant molecule on earth. It is the only one that can be found naturally in solid, liquid and gas and is essential to all life on earth. From the ability to store energy, through photosynthesis to the consumption of energy through respiration, the properties of water provide a perfect medium for biological reactions that occur within cells. The water that evaporates from the ocean with sun's energy is transported by the circulation of winds around the planet. Upon rising over the contours of the mountains, it cools and becomes rain, providing moisture to rain forest, jungles, grasslands. It feeds streams, rivers, lakes and groundwater before eventually returning to the sea. Through this way, it is absorbed by plants and drunk by animals, which all require water as it constitutes 55-80% of all living things.

Nutrient Cycles: Chemical elements that make up a living being such as carbon, oxygen, nitrogen, hydrogen, potassium, calcium, phosphorus, sulphur and many others are transported between living organisms and non-living components of the planet.

These elements are essential for the structure and function of living organisms. Some will accumulate in them while they are alive and return to the soil and the atmosphere when they die. Drastic changes in the dynamics of these cycles produce pollution, eutrophication (surplus nutrient levels in wetlands) and ultimately global change. Carbon is found in the atmosphere, biosphere, oceans and sediments. Plants take carbon(iv)oxide from the atmosphere and convert it into carbohydrates and in this form, a large part of global carbon is stored in forests and soils. In the sea, many organisms use carbon to form their external skeletons and shells. Carbon returns to the atmosphere through respiration of organisms, organic decomposition, combustion and volcanic eruption.

Energy flow-living organisms require energy to perform the basic functions of growth, reproduction and survival. Plants are primary producers that convert the sun's energy into chemical energy through photosynthesis. First, the molecule of chlorophyll absorbs energy from light and splits water molecules into hydrogen and oxygen. Secondly, carbon(iv)oxide is converted into carbohydrates (sugars) that is larger molecules composed of carbon, hydrogen and oxygen. Herbivores as secondary consumers feed on the plants and derive nutrients and energy from them. These are in turn passes on to carnivores and decomposers. The flow of energy through living things is called a trophic chain or food chain and each level passed along the chain is called a trophic level.

In order to use energy, the vast majority of living organisms need to split up the molecules where it is stored. Carbohydrates on reaction with oxygen are broken releasing energy and reforming molecules of carbon(iv)oxide and water. This process is known as respiration. Some organisms can obtain energy directly from inorganic molecules (chemosynthesis).

Succession: Ecosystems are dynamic and their composition and structure changes over time. Periodic disturbances such as fires, hurricanes, droughts, floods and pests occur and these can substantially alter the grasslands, forests, marshes, mangroves and other communities. Such events are known as disturbance regimes and change from region to region depending on climatic conditions. Following a disturbance that affects some of the populations, the process of community change to its previous (mature) state is called ecological succession.

When the change of environment has been total, as in the case of an eruption that completely erases the original environment or when a completely new environment is created, such as in the volcanic Island that rises from the sea, the process is called **Primary Succession**.

When the change has only been partial and some of the original species remain, the process is called **Secondary Succession**.

3.3 Challenges of Ecosystem Processes

Some of the primary challenges of Ecosystem processes include: habit loss, climate change including sea level rise and levee stability.

Habitat Loss

Habitat loss has been implicated as a major factor in species extinction. Habitat is the physical and biological setting in which organisms live and in which other components of the environments are encountered. Habitats are diverse in character and they include the water column, submerged substrates, adjacent inter tidal, wetlands and upland areas, agricultural fields, levees, rivers and streams, the estuary. Factors that affect Ecosystem processes include: flow rate and volume, temperature, turbidity and salinity(Relate it to challenges of **Ecosystem Processes**).

Climate Change

Climate change is a challenge confronting the management and restoration of the ecosystem. Mean climate change and its variability affect the physical and ecological structure of the ecosystem as well as the water content. Climate change begins with increasing temperature. Due to temperature rise, the pattern of precipitation and runoff is expected to change significantly and that affects the entire ecosystem processes. This also affects changes in hydrology, and sea level rise on the ecology, all these affect the performance of different species in the ecosystem. Other challenges affecting the Ecological/ Ecosystem processes include population growth; this means the population growth that will exceed the carrying capacity of the Ecosystem. Population explosion in ecosystem will also destroy ecological basis.

Where is the discussion on sea level rise and levee stability?

3.4 SOLUTIONS TO PROBLEMS OF ECOSYSTEM PROCESSES

The approaches in solving the problems of Ecosystem processes are:-

- (1) Adaptive Management
- (2) Natural Resource Management
- (3) Strategic Management
- (4) Command and Control Management

Ecosystem management is a process that aims to conserve major ecological services and restore natural resources while meeting the socio economic, political and cultural needs of future generations. The essence of ecosystem management is the efficient maintenance and socially appropriate use of natural resources (move to the appropriate place).

Adaptive Management

The major goal of Adaptive Management is to manage the ecosystem so that it maintains the greatest amount of ecological integrity, but also to utilize management practices that have the ability to change based on new experience and insights. Adaptive management aims to identify uncertainties in the management of an ecosystem while using hypothesis testing to further understand the system.

Strategic Management

Strategic management encourages the establishment of goals that will sustain the ecosystem while keeping socioeconomic and politically relevant policy drivers in mind. It involves the stakeholders in ecosystem management to develop the best management strategy for an ecosystem. It also places a high level of importance on evaluating and reviewing any changes, progress or negative impacts and prioritizes flexibility in adapting management protocols as a result of new information.

Landscape level conservation is a method that considers wildlife needs at a broader landscape level scale when implementing conservation initiatives. This approach to ecosystem management involves the consideration of broad scale interconnected ecological systems that acknowledges the whole scope of an environmental problem. Landscape level conservation is carried out in the following ways??? using wildlife corridor, habitat fragmentation and environmental degradation.

What about Natural Resource Management and Command and Control Management???

4.0 Conclusion

In this unit, you should learn about developmental increase?? and their effects on ecosystem processes. You have also learnt about Adaptive management, Strategic management and Landscape level conservation.

5.0 Summary

This unit has shown that ecosystem processes can be affected by many factors such as habitat loss, climate change and levee stability. We also learnt that these problems can be solved through Adaptive management, Strategic management and Control management.

6.0 Tutor Marked Assignment

Explain briefly the following terms:

- i. Climate change
- ii. Adaptive management
- iii. Strategic management and Levee stability

7.0 References and Further Reading

Barbier, E. (2007). *Natural Resources and Economic Development*, Cambridge University Press.

Carruthers J. (2004) "Africa: Histories, Ecologies and Societies". *Environment and History*. 10, pp. 379-406.

Collins, P.H (2004). *Dictionary of environment and ecology*. Bloomsbury publishing, 5 ed. London, WLD 3HB.

Conservation International (2002): www.conservation.org/sp/CIWEB/strategy/hotspots/guinean-forest.YML.

Eric L. J. (1991). "The History of Natural Resources Exploitation in the Western World". *Research in Economic History*, Supplement 6, pp. 235-252.

MODULE 5: Components of Ecosystem Processes.

Unit 1: Concepts of ecosystem processes development.

Unit 2: Developmental stages of ecosystem processes.

Unit 3: Planning of Ecosystem Processes.

Unit 4: Developmental Influence on Natural Resources and Ecosystem Processes.

Unit 1: Concept of ecosystem processes.

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3.1 Definition of ecosystem processes

3.2 Management of ecosystem processes

3.3 Factors affecting Ecosystem Processes.

3.4 Ways of Improving Ecosystem Processes.

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignments.

7.0 Reference and Further Studies

1.0 Introduction

You can now define ecosystem processes, taking into considerations, interactions and adaptations of organisms in abiotic processes.

2.0 Objectives

At the end of this unit, you should be able to define energy flow, water cycle, community dynamics and organisms adaptations.

3.0 Main content

3.1 Definition of Ecosystem Processes

Give the definition(s) of ecosystem processes as the title suggest in this section. Some of the issues presented are not definitions.

Ecologically, ecosystem consists of organisms, the communities they comprise, and the non-living aspects of their environment. The four main levels of study in ecological system are the organism, population, community and ecosystem.

Ecosystem processes therefore, are those that sustain and regulate the environment. Ecosystem processes also involve the interactions and adaptations of organism within an ecosystem to the abiotic processes that drive the development of those ecosystems. Ecosystem processes include decomposition , production (of plant matter) , nutrient cycling , and fluxes of nutrients and energy .The four fundamental ecological processes of ecosystem are the

water cycle , energy flow and community dynamics ie how the composition and the structure of an ecosystem changes following a disturbance (succession)????.

Water cycle: This determines whether rain evaporates and runoff from the soil occurs, or whether it waters plants and recharges ground water. It also shows how soil conditions at the soil surface can cause or prevent droughts, floods and desertification.(Why discussion on water cycle only?

Energy flow explores the energy that drives ecosystem processes while Mineral cycles explores the ecology of the chemicals that make up the bulk of life on earth and community dynamics in the ecosystem determines the level of energy and labor to maintain a field.

3.2 Management of Ecosystem Processes.

The main objective of ecosystem management is the efficient maintenance and socially appropriate use of natural resources. It is a multifaceted and holistic approach which requires a significant change in how the natural and human environments are identified; this is known as adaptive management. Ecosystem process management involves conservation of major ecological processes and the restoration of natural resources while meeting the socioeconomic, political and cultural needs of people. Ecosystem process management also includes efficient maintenance and socially appropriate use of natural resources. Ecosystem processes are multifaceted and take into consideration human interaction within the environment. These ecosystem processes management are interwoven and they include adaptive management, natural resources management, strategic management and command and control management.
Repetition

Ecosystem processes management also use natural systems such as reforestation, restoration of riparian zones, wetlands to mitigate against the damaging impacts of flood. Natural solutions have the ability to slow down flood flows and retain waters in natural areas such as forests, wetlands and flood plains.

3.3 Factors Affecting Ecosystem Processes.

Relate the discussion to Factors Affecting Ecosystem Processes

Factors affecting ecosystem processes can be abiotic which include light, in this case , the sun is the main source of energy to all life on earth; Light affects living things in terms of intensity, quality and duration. Others are temperature, atmospheric pressure, humidity, which affects the rate at which water evaporates from the surface of organism such as in transpiration or sweating. Wind also affects the ecosystem processes.

Furthermore, in terms of light on ecosystem processes, green plants and photosynthetic bacteria need light to manufacture their food. Animals depend on plants for food. Light affects living things in terms of intensity, quality and duration. Light intensity and quality affects

photosynthesis, flowering and germination of plants while in animals affect migration, hibernation and reproduction.

Temperature: Biochemical processes of most organisms function effectively within a range of temperature. Temperature varies due to seasons, altitude, latitude and also diurnally especially in hot deserts. This therefore affects the distribution of organisms in terrestrial habitats.

Atmospheric pressure: the atmosphere has a definite weight and it exerts weight on earth. Atmospheric pressure varies with altitude, which affects the amount of oxygen for respiration and Carbon dioxide for photosynthesis.

Humidity is the amount of water vapor in the atmosphere, when humidity is high there is much water and vice versa.

Wind is moving air. It increases the rate of water loss from the organisms, therefore affecting distribution. Wind is important for the formation of rain. Wind causes wave formation in lakes and oceans.

3.4 Ways of Improving Ecosystem Processes.

The methods of improving Ecosystem processes include aerating major new sources of Carbon emission from the use of fossil fuels; by degrading natural sinks of Carbon by polluting or transforming natural ecosystems. Other ways include cost effective mitigation and adaptation for climate stabilization through the use of natural carbon sequestration processes. Another method is secured delivery of essential ecosystem services such as clean air, food, and water security. It will be very important to make ecological awareness part of our social life and culture.

Recycle: This is the most common and in the most cities, most accessible mitigative measure we can adopt for the environment. Maximize the global ecosystem capacity to absorb GHGS, minimize emissions from ecosystem and reduce emissions due to human activity.

4.0 Conclusion

This unit unfolds the concept of organisms interactions through ecological systems processes and showing also ways of improving ecosystem processes.

5.0 Summary

In this unit, ecosystem processes sustain and regulate the environment. Ecosystem processes also involve the interactions and adaptations of organisms within an ecosystem in the development of ecosystems.

6.0 Tutor Marked Assignments.

- *Define the term Ecosystem processes.
- * State the factors affecting ecosystem processes.
- * Explain briefly the essence of organisms interactions in Ecosystem processes.

7.0 Reference and Further Studies.

Barbier, E.(2007). *Natural Resources and Economic Development*, Cambridge University Press.

Collin P.H.(2004). *Dictionary of environment and ecology*, Bloomsbury publishing, 5ed , London, WLD 3HB.

Soule, M. E. and Wilcox B.A (1980). *Conservation Biology: An Evolutionary – Ecological perspective*. Sinauer Associates ,Sunderland, Massachusetts.

Unit 2: DEVELOPMENTAL STAGES OF ECOSYSTEM PROCESSES.

CONTENTS

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2.0 Objectives

3.0 Main Content

3.1 Concept of Ecological Developmental Stages

3.2 Challenges of Ecosystem Developmental Stages

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3.4 Causes of the Problems of Ecosystem Developmental Stages

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignments

7.0 Reference and Further Studies

1.0 Introduction

In this introductory aspect, you will be familiar with the concept of ecosystem development stages. You will also know causes of the problems affecting Ecosystem development.

2.0 Objectives

At the end of this unit, you should be able to define Ecosystem developmental stages, climax communities and intermediate stages.

3.0 Main content

3.1 Concept of Ecosystem Developmental Stages.

Start by explain what th **Concept of Ecosystem Developmental Stages** means

There are five main elements to ecological succession, these include primary succession, secondary succession, pioneer and niche species, climax communities and sub climax communities.

Primary Succession

Primary succession occurs when organisms colonize an area devoid of life, usually after a catastrophic natural event that leaves the land bare. Algae, Fungi and Simple plants like lichens and mosses are firstly established here. Overtime, a thin layer of soil builds up so that more advanced plants, such as grasses and ferns get established. Followed to the plants are animals such as insects, bird, and small invertebrates.

Secondary Succession

Start with the meaning of secondary succession

And Ecosystem developmental stage is the secondary succession. In this aspect, most ecological changes occur most biological communities are in a continual state of secondary succession(Recast). Different sets of plants replace an established community. Most ecosystems a times experience disturbances like wildfires or flooding.

Intermediate Stages

An ecosystem undergoes intermediate stages of succession how?. These changes form a continuum between the two end points; in these stages ,quickly forming climax communities which are the short grasses and long grasses that can survive in such succession??.

Climax Communities-

These are relatively stable and can vary widely in a given region, especially when the landscape consists of high mountains and low valleys. In such situations, final biological matrix of plants and animals can cover vast tracts of land or be limited to a landscape. A climax community is dependent on rainfall, soil, altitude and temperature.

What about sub-climax communities and pioneer and niche species?

3.2 Challenges of Ecosystem Developmental Stages.

Some challenges of ecosystem developmental stages include habitat loss, climate change including sea level rise, and level stability.

Habitat Loss

Habitat is the physical and biological setting in which organisms live and in which other components of the environment are encountered. Submerged substrates, Wetland, Upland areas, agricultural fields, rivers and streams can cause habitat loss How?. High temperature and salinity can also affect ecosystem development.

Climate Change:

Climate change is a challenge confronting the developmental stage of ecosystem. This involves changes in mean climate and its variability which affect physical and ecological structure of the ecosystem. Climate change also leads to increasing temperature, which affects precipitation, and runoff. These factors affect the ecosystem, in terms of precipitation, flows, and temperature which disrupts ecosystem species. Climate change also affects sea level rise and hydrological cycles which affect seriously ecosystem development.

Climate change also affect the water temperature of the ecosystem which reflects in the form of solar insolation, surface heat exchanges, river flows and dispersion as well as temperature in the ecosystem.

Other problems of ecosystem development stages include: Endangerment of species, Loss of livelihood for many people, Water pollution, soil pollution, resource depletion, global warming and Biodiversity loss.

Endangerment of species:

Some of our ecological problems can lead to the endangerment or even extinction of species. Some species only occur in few parts of our environmental system. If these areas are destroyed due to natural disasters or due to human intervention, these species will be lost forever.

Loss of livelihood for many people

Through ecological problems like green house gas emission and the resulting effects of global warming, many people will loss their livelihood. This may be due to the fact that global warming will exacerbate the problem of water scarcity. Many islands will be flooded due to arise in sea levels. This will also destroy the livelihood of many people and will also lead to migration movements of the affected people.

Water pollution

Due to illegal dumping, significant levels of water pollution can occur. For example, in many developing countries, industrial waste is often just disposed into nearby lakes or rivers, which leads to significant water pollution.

Air pollution

Significant amount of air pollution can occur due to individual manufacturing processes and also due to the daily use of motor vehicles. Air pollution contributes to the global warming issue and may also hurt ecological systems since animals are usually quite sensitive to their natural living conditions. If there is too much air pollution, animals population may decline due to diseases related to air pollution.

Soil pollution

Due to natural causes like earthquake or also through human intervention, the soil in many ecosystems can become polluted which hurts the local flora and fauna and can lead to further ecological problems since ecosystems are quite complex and interactional.

Biodiversity loss

Biodiversity loss may be caused by many ecological problems, either by natural causes like earthquakes or through human interventions in ecological system. The problem of biodiversity loss is likely to increase in the future due to many ecological problems our planets currently faces.

3.3 Solutions to Ecological Developmental Stages.

One of the solutions to Ecosystem development stages includes increased control or homeostasis with the physical environment in the sense of achieving maximum protection from its perturbations. Other solutions for ecosystem development process include conservation areas, restore ecological systems, government regulations, high fines for littering and illegal dumping, stop deforestation, reduce consumption , reduce waste , reuse and recycle and education.

Conservation areas

One measure to protect ecosystem stages is to install conservation areas where animals and plant population can recover and live in peace with nature and are safe from harmful human interventions .Conservation areas may therefore help to re- establish the balance of ecosystems.

Restore ecological systems.

Many ecological systems had been suffering from human interventions in the past. These ecosystems should be restored in order to preserve endangered species and to give them a habitat where they can restore their populations.

Government regulations

There should be e strict government regulations regarding the use of natural habitats for human purposes. Government should set a framework in which the protection of ecologicalsystems is regarded more important than the goal of profit maximization of firms.

High fines for littering and illegal dumping

Illegal dumping and littering can impose severe damage on our ecosystems. Therefore, in order to reduce the incentive for those harmful actions, fines and control mechanisms regarding those actions should be increased significantly.

Stop deforestation.

Our forests are crucial for human survival since they are storage spaces for many harmful gases and also provide plenty of oxygen. They are also a natural habitat for a variety of animals and other organisms. Thus, in order to mitigate a variety of ecological problems, we have to stop or at least reduce the level of deforestation.

Reduce waste.

Large amount of wastes are produced everyday. In order to get rid of this waste, a significant fraction of it is burned which leads to all sorts of ecosystem problems. Moreover, another part of the waste is dumped into landfills, where toxic chemicals may lead to massive soil pollution. In order to mitigate the adverse effect on our ecological systems, we should try to reduce waste production whenever possible in our daily life.

Reuse and recycle:

Reusing and recycling material things is crucial in order to mitigate several ecosystem issues. Till working, ask your family or friends if they need those items; if not, at least make sure that you dispose those items appropriately in order to enable effective recycling.

Education

We have to educate our children about the adverse effects of human intervention on our ecological systems. By doing so, when those children grow up, they are likely to behave in an ecologically- friendly manner. Moreover, children are often able to convince their parents which may also behave more environmentally-friendly.

3.4 Causes of the Problems of Ecosystem Developmental Processes.

Causes of the ecosystem developmental problems are Drought, Earthquake, Tornadoes, Heavy rainfall and Floods, Mining, Destruction of natural habitats, Illegal dumping, Littering, Emission of green house gases ,Excessive consumption and Excessive wastes.

Draughts

Draughts can lead to serious ecological problems since they can change the dynamics of an ecological system. For example, draughts can lead to the deaths of many animals and plants

which in turn affects several other organisms. This can lead to a point where the ecological balance is lost and new equilibrium state can occur.

Earthquakes

Earthquakes can also wipe out animals and plant species on a large scale therefore change the affected ecological systems in an adverse manner. Earthquake can also lead to spread of diseases due to unhygienic conditions and therefore may further affect ecological systems.

Tornadoes

Tornadoes can lead to a change in the structure of ecological system. Tornadoes may destroy buildings, and may lead to the destruction of forests. This forest destruction in turn hurts many animals which now have to relocate to new habitats. In turn, this could lead to an imbalance in the ecosystem and may hurt biodiversity.

Heavy rainfalls and floods

Rainfalls and floods can also hurt ecosystems since many plants and animals are likely to drown. Moreover, a mass of dead animals can also lead to a spread of diseases or even to a spread of epidemics or pandemics.

Mining

Due to increasing world population and rising consumption levels, we have to extract an increasing amount of resources out of the ground. However, the extraction process through mining can hurt ecological systems since mining often leads to soil pollution and also destroys natural habitats of animals which then have to find new habitats to relocate in order to survive.

Destruction of natural habitats

Human intervention leads to the destruction of many habitats worldwide. This is especially true when it comes to destruction of what? Large areas of forest are cut down on a daily basis. In certain areas, forests are cut down to get more spaces for farming purposes, but this is harmful to local ecosystems since it destroys the habitat of a wide variety of species.

Illegal dumping

Illegal dumping is a big problem for ecosystems; especially in poor developing countries. Individuals often dump their trash into nearby rivers and lakes which leads to several kinds of pollution and therefore hurts many animals and plants which are living in those ecosystems.

Emission of green house gases

The emission of green house gases can have severe adverse effects on ecological systems since green houses contribute to a global warming. Global warming in turn leads to several kinds

of ecological problems and many animals and plants will lose their natural habitats due to the effects of climate change.

4.0 Conclusion

In this unit, you have learnt the processes involved in Ecosystem processes. You here also had known the implications of these problems and possible solutions or management of ecosystem processes.

5.0 Summary.

This unit clearly showed the processes involved in ecosystem management.

6.0 Tutor Marked Assignments.

- i. Explain briefly how human interventions can lead to the destruction of the habitats.
- ii. Define the global warming.

7.0 References and Further Studies.

Johnson, D. L. , S. H. Ambrose, T.J and A. E . Winter- Nelson(1997). Meanings of Environmental terms. *Journal of Environmental Quality* 26: 581- 589.

Odum E. P.,(1971). *Fundamentals of Ecology* . 3rd ed. Saunders New York.

Unit 3: Planning of Ecosystem Processes.

Contents

1.0 Introduction

2.0 Objective

3.0 Main Content

3.1 Principles of Ecosystem Planning

3.2 Importance of Planning of Ecosystem

3.3 Factors Affecting Planning Ecosystem

3.4 Problems of Ecosystem Planning

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignment

7.0 References and Further Studies

1.0 Introduction

Planning of Ecosystem processes will be made known to the students. They will also know importance of planning of Ecosystem and the factors affecting this planning.

2.0 Objectives

At the end of this unit, the student will be able to know the principle of planning and management of ecosystem processes.

3.0 Main content

3.1 Principles of ecosystem planning

The principles of ecosystem planning are as follows:- Objectives of the planning, Management, effects, potentials, conservation of ecosystem structure, functionality, scales, recognition, balance and integration, information, and relevant sectors of the society.

The ecosystem processes planning principles should include:- Itemize the principles

Objectives of management of natural resources such as land, water and living resources that are a matter of the needs of the people.

Management:- management should be decentralized to the appropriate level.

Ecosystem managers should consider the effects of their activities on other ecosystems.

Principles should recognize potential gains from management, there is usually a need to understand and manage ecosystem in an economic context, so as to reduce those market distortions that will affect biological diversity adversely.

Conservation of ecosystem structure and functioning or capabilities so as to maintain ecosystem services. Ecosystems must be managed within the limits of their functioning.

The ecosystem principle should be undertaken at the appropriate scales. Management must recognize that change is inevitable.

The ecosystem approach should also seek the appropriate balance between, and integration of conservation and use of biological diversity.

The principle should also consider all forms of relevant information including scientific, indigenous and local knowledge, innovations and practices.

Ecosystem principles should also involve all relevant sectors of societies and scientific disciplines.

3.2 Importance of Planning of Ecosystem Processes.

It regulates the essential ecological processes, support life systems and renders the stability of the ecosystem.

It is responsible for the cycling and recycling of nutrients between biotic and abiotic components.

Planning of ecosystem processes ensures a balance among the various trophic levels.

It cycles the minerals through the biosphere.

Planning of ecosystem processes also enhances the abiotic components to help in the synthesis of organic components that involves the exchange of energy.

3.3 Factors Affecting the Planning of Ecosystem.

Salinity:-

Salinity denotes the salt concentration of water, causing a division of the aquatic environment into marine, estuarine and freshwater. Saline conditions pose the problems of water loss from the body to the environment. Only animals with suitable osmoregulation adaptation can occupy such habitats.

pH (Hydrogen ion Concentration)

pH is a measure of the degree of acidity or alkalinity of the soil or water. pH influences the distribution of plants and animals in soil and freshwater ponds. Some plants thrive well in acidic conditions while others in alkaline conditions. The pH of a soil can be altered by leaching, fertilizers applied or soil exhaustion. pH is expressed in terms of pH scale and can be measured by universal indicator or pH meter.

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Is salinity and pH the only Factors Affecting the Planning of Ecosystem?

3.4: Importance of Ecosystem Planning.

.The importance of **Ecosystem Planning includes:**

- i.Ecosystem planning helps to provide adequate habitat for plants and animals.
- ii.Ecosystem planning helps to regulate essential ecological processes and support life.
- iii.Ecosystem planning plays an important role on crop rotation, controlling weeds, management of grasslands, forests, biological surveys, conservation of the soil and wildlife.

Ecosystem planning also enhances free flow and recycling of nutrients between biotic and abiotic components.

Ecosystem planning ensures mutual relationship between the producers, consumers and decomposers. It also maintains a balance among the various trophic levels in the ecosystem.

Ecosystem planning helps with industry and urban expansion at unprecedented rates translates??? the benefits we receive from nature into economic terms so that we can better understand the trade-offs we are making between nature and individual development like conserving the environment.

Ecosystem planning also helps to adjust the cost benefit analysis by evaluating the negative effects development will have on the natural environment.

Ecosystem planning helps in maintaining healthy economy while also protecting the ecological process for future generations.

4.0 Conclusion

In this unit, the students have also learnt about the causes, and solutions in the developmental processes in ecological systems.

5.0 Summary

This unit has clearly indicated that the main objective of ecosystem management is the efficient maintenance of socially appropriate use of natural resources.

It also shows that there are multifaceted and holistic approaches in the management of Ecosystem processes.

6.0 Tutor Marked Assignments.

- Using relevant examples, explain briefly developmental stages with stages .
- State the factors on which climax community depend.

7.0 References

MC Conrick, J. (2001) . Environmental policy in the European Union. The European Series. Palgrave p.21.

Micholson, M.(1986). *The Environmental Age, a stimulating account of the Evolution of policies and approaches of environmental protection*. Cambridge, University press, Cambridge.

Odum E. P.(1971). *Fundamentals of Ecology*, 3rd . ed. Saunders New York.

Unit 4: Developmental Influences on Natural Resources and Ecosystem Processes(The whole unit is not well presented and discussed.Revist the unit)

Contents

1.0 Introduction

2.0 Objectives

3.0 Main Content.

3.1 Concept of Development Processes on Natural Resources and Ecosystem.

3.2 Influence of Development on Natural Resources and Ecosystem

3.3 Amelioration of Developmental Processes Impact on Natural Resources and Ecosystem

3.4 Importance of Natural Resources and Ecosystem

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignments

7.0 Reference of Further Studies.

1.0 Introduction

The student can now know the developmental influence on Natural Resources and Ecosystems. The students will also know how to solve the problems caused by developmental processes on natural resources and ecosystems(This is not introduction on the subject matter).

2.0 Objectives

At the end of this unit, the students should be able to explain developmental processes with examples, mitigating measures on the problems affecting natural resources and ecosystems. Learn the concept of Deforestation, Climate change, Urbanization on and mining on ecosystems.

3.0 Main content

3.1 Concept of Development Processes on Natural Resources and Ecosystem

Development process or sustainable development(Is development process same as sustainable development) is the organizing principle for meeting human development needs and

simultaneously sustaining the ability of natural system to provide the natural resources and ecosystem services upon which the economy and society depends. The desired result is a state of society where living conditions and resources are used to continue to meet human needs without disrupting the integrity and stability of the natural system. Development processes consider sustainable forest management, economic, social and environmental development for future generations. Increasing development processes considers the preservation of natural resources and ecosystems so that none will be adversely affected. Increasing developmental processes also takes care of non- reversible resources, since any positive rate of exploitation will eventually lead to exhaustion of earth's finite stock. Thus, the need to lay more emphasis on conservation management to economic development.

3.2 Influence of Development Processes on Natural Resources and Ecosystem.

Some of these developmental processes (you have not listed any development processes) can affect deforestation (why only deforestation?) which affects adversely natural resources and ecosystem.

Deforestation is adverse lost of forest cover and its transformation into another land use (define deforestation properly). This reduces tree canopy cover and also affects biodiversity. Due to deforestation, soil is exposed and available nutrients are lost, due to the removal of the ground cover or the forest is removed permanently. Carbon iv oxide emission due to global warming because of the burning of tropical forests will negatively affect other natural resources and ecosystem for forests influence climate, forests transport great quantities of water to the atmosphere through plant transportation (Recast the sentence). Much of the transpired water replenishes the clouds and rains that nourish the forests. Due to forestation, much of the rain will flow as river water flow into oceans and the area will be very arid???. In this aspect (which aspect), forests maintain local climate and strongly influence global fluxes of oxygen and Carbon IV oxide. Forests enhance tremendous biological diversity which affect the natural resources and ecosystem. The variety of crops provided by the forests, medicinal plants, ambient temperature and all thee natural species are lost due to deforestation.

Increased development process like urbanization also causes deforestation The impact of urbanization through the development of roads, markets, bridges, estates and the use of mechanized equipments will adversely affect natural resources and ecosystemS.

Mining (You need to list mining activity as a development process before discussing it)

Environmental impacts of mining can occur at local, regional and global scales through direct and indirect mining practices which impacts can result in erosion, sinkholes, loss of biodiversity contamination of soil, groundwater and surface water by the chemicals emitted from mining processes which adversely affect the natural resources and ecosystem. The developmental

processes also have impact on atmosphere from the emissions of carbon which have effect on the quality of human health and biodiversity.(link to mining)

Mining can also lead to land pollution, which is the degradation of the earth's land surface through the misuse of soil due to agricultural activities, mineral exploitation, industrial waste dumping and even indiscriminate disposal of urban wastes which can destroy natural resources and ecosystem(Recast the sentence). Ecosystem can also be polluted by the chemicals in pesticides and herbicides used for agricultural purposes along with waste matter either in urban, remote, forestry areas or grassland areas such as roads, parks and streets.

Furthermore, natural resources exploitation, exploration, mining, and processing have caused different types of (environmental) natural resources and ecosystems damages which include ecological disturbances, destruction of natural flora and fauna, pollution of air water and land, instability of soil and rock masses; Landscape degradation, desertification and global warming. The environmental developmental damage has in turn resulted in waste of arable land as well as economic crops and trees. Since much of the damage is inevitable if natural resources and ecosystem must be developed, both the government and the natural resources industry must be involved in taking precautionary and remedial measures that can minimize the effects of increasing developmental processes on ecosystem and natural resources exploitation. Emphasis should shift from waste disposal to waste minimization through sorting, recycling, bio remediating afforestation, sewage treatment, and pollution control while the government should provide the regulation.

3.3 Amelioration of Developmental Processes Impact on Natural Resources and Ecosystem.

Waste and waste disposals. Why waste and waste disposal when you are suppose to be discussing Amelioration of Developmental Processes Impact on Natural Resources and Ecosystem?? The discussion is not properly connected with the title on 3.3

Wastes and waste disposals constitute serious challenge to the natural resources and ecosystems. Waste is an unwanted substance, a by-product, exudates, or undesired substance .Waste can also be defined as unwanted material that is of no immediate use, or is no longer needed. Waste disposal is a process of getting rid of unwanted materials. Wastes include food wastes, paper, plastic, metal, containers, gas effluents, glass, leather, boxes, refrigerators, scraps of metals, tyres. Wastes can also be classified as solid, liquid and gaseous wastes. These wastes are most times hazardous to the environment and adversely affect natural resources and ecosystems. Those wastes can also be classified as either organic or inorganic wastes. Organic wastes decompose early while inorganic wastes takes longer time to decompose but their impact on ecosystem are mostly hazardous.

Waste disposals can be in the form of open site dumping which normally takes place in urban areas, the landfill is a method of waste disposal where wastes can be disposed into quarries, mining or in borrow pits. Incineration involves combustion of waste materials and this normally leads to emission of gaseous pollutants. Indiscriminate dumping wastes into streams and river courses can cause serious problems to natural resources and ecosystem. The major consequences of waste disposal systems include deaths of plants (flora), animals (fauna), and people, pollution of soil and water resources and destruction of lives and properties. In view of the hazardous effects of wastes, their effects should be ameliorated in the following by turning wastes to wealth where waste management should concern itself not only with final disposal of waste but also with the whole cycle of waste creation, transports, treatment, and recovery so as to minimize pollution. It also should be in the form of waste prevention, internal cycling of production waste, and source-oriented improvement of waste quality and reuse of products for the same purpose. Also, external recycling, sorting of waste reuse for another purpose and energy recovery are included as waste management measures. Waste management is also viewed as the control of waste-related activities with the aim of protecting human health and environment and natural resources and ecosystem conservation.

3.4 Importance of Natural Resources and Ecosystem

Natural resources provide fundamental life support, in the form of both consumptive and public good services. Ecological processes (ecosystems) maintain soil productivity, nutrient recycling, the cleansing of air and water, and climatic cycles. Biodiversity encompasses the variety of all life on earth. Natural resources management is also referred to as major natural resources such as land, water, air, mineral, forests, fisheries, and flora and fauna. These resources provide better quality to human life.

Biological diversity (biodiversity) is the occurrence of different types of ecosystems, different species of organisms with the whole range of their variants and genes adapted to different climates, and environments along with their interaction and processes which enhance good life on planet earth. (You have not discussed the **Importance of Natural Resources and Ecosystems**)

4.0 Conclusion

In this unit, the students have learnt the concept of developmental processes on natural resources and ecosystem. You also learnt that increasing developmental processes ???consider the preservation of natural resources and ecosystems so that none will be adversely affected.

5.0 Summary

This unit has also explained the consequences of exploitation, exploration, mining and processing which have caused damages on the natural resources and ecosystems.

6.0 Tutor Marked Assignments

* Describe briefly these terms: Landscape degradation, Green house gases [GHG], biodiversity and global fluxes of oxygen and carbon IV oxide.

7.0 Reference for Further Reading

Asant F. and Ramseye J (2017). “Environmental Impact of Mining”. Global Congress on process Safety. include publishers

Blewi H, John S(2015). *Understandable Sustainable Development*(2nd ed.) London: Routledge.

Turner K, Keny R(1988). “Sustainability, Resource Conservation and Pollution Control: An Overview in Turner, R. Keny (eds) *Sustainable Environmental Management*. London. Belhaven Press.

Laura. J, and Sonter L(2018). Mining and biodiversity; key issues and research needs in conservation science. *Proceedings of the Royal society Biological sciences* 285.

Zhang L, Wang J and Zhongke L (2015). Effects of vegetation on runoff and soil erosion on reclaimed land in an open cast coal mine dump in a loess area Include publishers

Observations

1.This document needs to be reworked to make a good reading

2.So many unnecessary repetition

3. Contents in some modules does not tally with the title

4. Introduction to the modules are not properly articulated. Summary and introduction are same in some cases

5. Some topics listed are not properly discussed or not at all

