

- ◆ <http://wikieducator.org/Kafuiaheto/Quizes>
- ◆ http://wikieducator.org/Lecture_notes/Resource_Materials

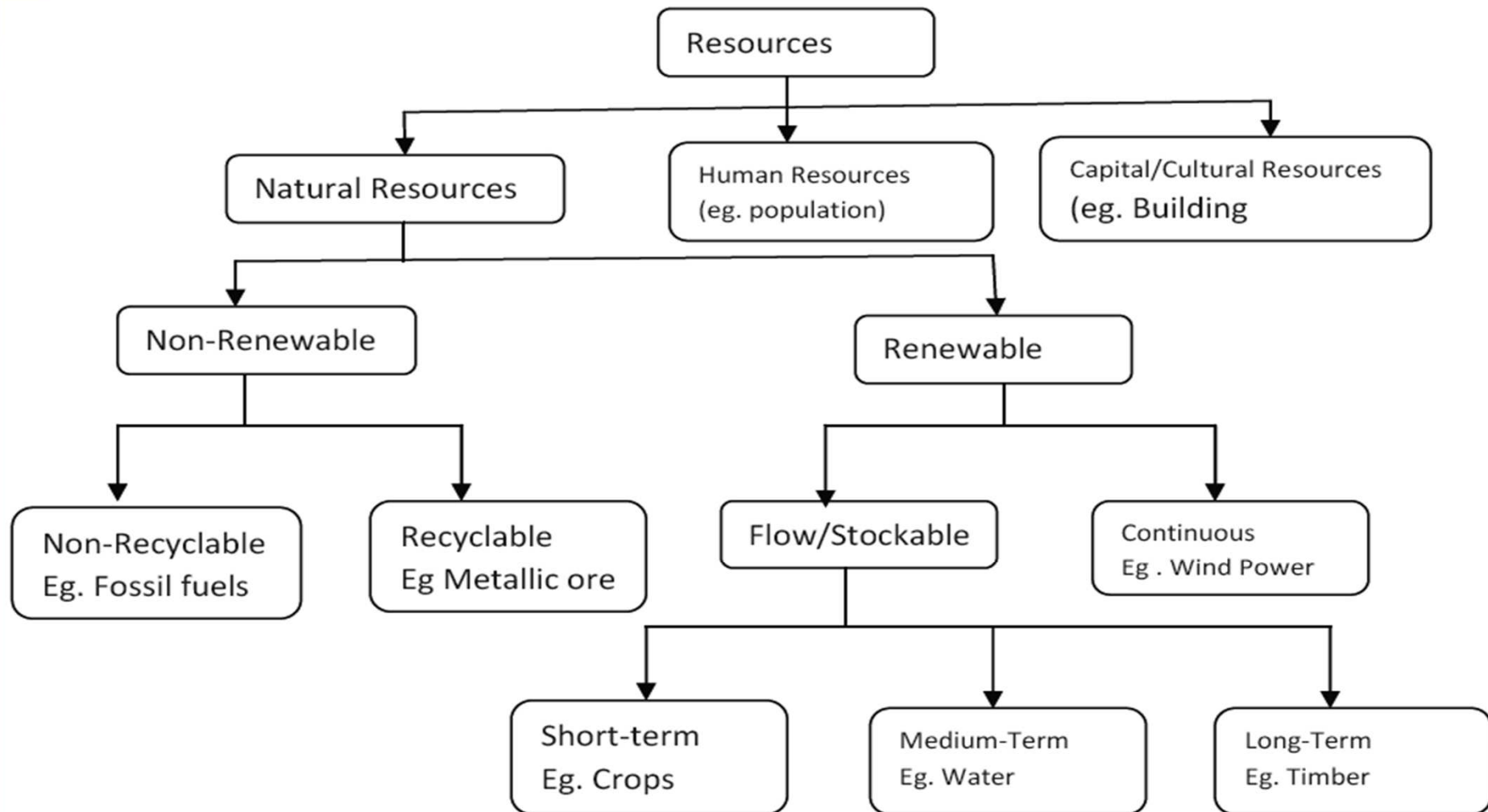
UNIT 2

CLASSIFICATION OF NATURAL RESOURCES

SESSION 1. THE CONTINUUM OF NATURAL RESOURCES

- ◆ **1.1 Resource Classification:**
- ◆ Resources are broadly categorized into:
- ◆ **Natural resources:** those part of the environment that people find useful; including materials and energy resources, climate, soils, natural vegetation, animal life and landscape etc.
- ◆ **Human Resources:** refers to the number and abilities(physical and mental) of people
- ◆ **Capital Resources:** those that aids in production and to living

Resource Classification

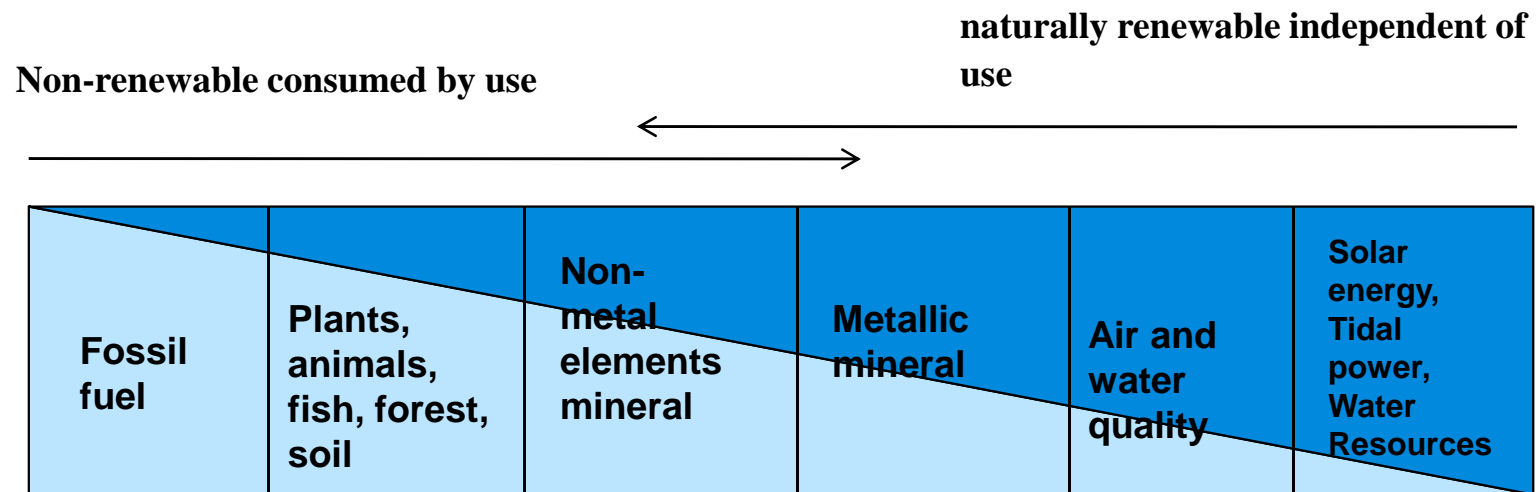


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- ◆ **Natural resources are further classified into:**
- ◆ **Non-Renewable:**(sometimes called flow resources) have taken millions of years to form and are fixed in supply. Examples include minerals and land
- ◆ **Renewable:**(also called stock resources) naturally regenerate to provide new supply units within a human time span

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- ◆ **1.2 The Resource Continuum:**
- ◆ It is difficult to identify a clear cut difference between renewable and non renewable resources.
- ◆ However, it is more appropriate to use **a continuum** to bring out the differences based on their **renewability**.
- ◆ The two basic classes are further subdivided on the **basis of the degree of susceptibility to modification by humans and the extent to which recycling is possible.**



The Resource Continuum

At the extreme right, potential supplies are naturally determined. At the other, utilization massively exceeds regeneration and use is consumptive, producing unusable forms of matter and energy. Between these extremes, renewability is dependent on human decisions, future supply availabilities being determined by usage rates and investment in artificial regeneration.

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- ◆ **Non-renewable resources** (also called non replenishable, fund, stock, inventory or organic resources) evolved over geological period time span and cannot be used without depleting the stock.
- ◆ This raises the question of ultimate exhaustibility since their rate of formation is so slow as to be meaningless in terms of the human lifespan.

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- ◆ There is no theoretical limit on the rate of use of non-renewable resource-it depends on society's capacity to exploit it.
- ◆ They also undergo physical and chemical changes during the resource formation process, which change their form, allowing for further subdivision on the basis of recyclability.

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- ◆ **Renewable resources** have a natural rate of availability and yield a continual flow of services..
- ◆ A distinction must be made between **flow (stockable) resources**, which can be depleted, sustained or increased by human activity
- ◆ And **continuous (non-stockable) resources** which are always available and independent of human activity (e.g solar and tidal energy)

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- ◆ Again, all natural resources are renewable, in the sense that they are part of a natural cycle (geological and biological cycles).
- ◆ However, they are usually subdivided according to their ability to renew or reproduce themselves at a rate meaningful to people.

SESSION 2: NON-RENEWABLE RESOURCES

- ◆ **2.1 Types of non-renewable resources:**
 - Resources that are consumed by use (e.g petroleum, oil, gas and coal)
 - Resources that are theoretically recoverable (elemental minerals and land in the natural condition)
 - Those that are recyclable like metallic minerals (e.g copper, iron, zinc, etc.)

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- ◆ **Fossils fuels:**
- ◆ Fossils are remains or impressions of organisms of past geological ages
- ◆ Fossil fuel were formed from past organic matter(plants and animals) which were buried millions of years ago.

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- ◆ **Land in the natural condition:**
- ◆ In the cultural life of any nation, certain areas under natural and undisturbed conditions may be said to be indispensable for the purposes of study and for inspirational values.

SESSION 3: RENEWABLE RESOURCES

- ◆ Also known as flow resources, **renewable resources** are defined as those that are naturally renewed within a sufficiently time span to be of relevance to human beings.
- ◆ Flow resources include air, water in places, land in its spatial sense or land for human activities, forest, grassland, animals, soil

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- ◆ However, we can further distinguish between those flows that do not appear to be dependent on human activity;
- ◆ And those that are only indefinitely renewable, if usage or consumption remains at or below their capacity to regenerate or reproduce.
- ◆ On this basis, therefore; we have “**critical zone**” and “**non critical zone**” flow resources.

3.2 “Critical zone” Flow Resources

- ◆ These are resources that are renewable but can be exploited to exhaustion.
- ◆ If the rate of consumption exceeds the rate of natural replenishment, such resources can be lost completely.
- ◆ At some point, if the depletion process far advance the rate of replenishment, that natural recovery of supply flows fail to take place even when all exploitation activities cease.

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- ◆ Resources that fall under this category are those that depend on biological reproduction for their renewal.
- ◆ It is well known that over-fishing, over hunting, over pollution and destruction of habitat have already damaged the regenerative capacity of many fauna species.

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- ◆ In addition, it is possible that some soil may also have critical zone.
- ◆ This occurs when the soil is overused and becomes degraded by soil erosion, salinization (to treat or contaminate something with salt) and desertification.

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- ◆ **Wild life resources:**
- ◆ They are important in bringing stability in their respective eco-systems
- ◆ Presently; however, wild life resources are attracting great importance and vitality for their aesthetic values.
- ◆ Nevertheless, as a critical zone resource, improper management and care will surely lead to depletion and extinction

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- ◆ Wildlife resources are exhaustible, but if proper care and management is adopted (e.g regulation which allows for periodic hunting of animals), it is possible to replenish them.

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- ◆ **Water in place:**
- ◆ Examples include, lakes, lagoons and aquifers (water bearing rock).
- ◆ These resources could be exhausted if improper care is taken.
- ◆ For aquifers for example, the only thing is that, the flow of water into the underground storage should not be impeded or restricted by improper land use.

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- ◆ In the same way, land use should not waste and pollute these water bodies.

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- ◆ **Soils:**
- ◆ Soils are replaceable or renewable but very slowly in nature.
- ◆ On the other hand, they can be exhausted through improper land use and excessive depletion of its nutrients.
- ◆ For this reason soil is classified as a critical zone resource.
- ◆ To some extent, soil can be rebuilt and maintained in quality and quantity by human effort.

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- ◆ **Land in its spatial sense:**
- ◆ Land in space or room is maintainable in the sense that it may be kept in shape to ensure intensive human use or prevented from being littered or personated.

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- ◆ **Forest:**
- ◆ Forests are critical zone resources which are renewable and replaceable (though at a high cost and great effort),
- ◆ But on the other hand it could be exhaustible and reduced to stock resources if extraction level exert enormous pressure beyond which the regenerative or renewal capacities are exceeded.

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- ◆ Misuse of forest also leads to other environmental problems such as climate change, landslides, erosion, extinction of plant and animal species and general socio-economic decline.

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- ◆ **Grassland and other foliage resources:**
- ◆ They are form of critical zone flow resource which could be renewed but also exhaustible if not properly managed.
- ◆ Grassland resources could be permanently be lost through desertification induced by overgrazing and soil erosion.

3.3 “Non Critical Zone Flow Resources”

- ◆ They remain renewable irrespective of human use or activity.
- ◆ These include the atmosphere, water in cycle, solar energy, tidal energy (and waves).
- ◆ They are largely inexhaustible although some can be depleted temporary by over use such as sewage discharge into water bodies, emissions of harmful substances.

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- ◆ In all such cases, quality and flow levels are naturally and speedily restored once depletive activities are controlled within the regenerative capacity.

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- ◆ **The atmosphere:**
- ◆ The atmosphere is a non-critical zone resource and includes the plenty of air around us, which is in-exhaustible and indispensable to human lives.
- ◆ Though the atmosphere is a natural resources that maintains its quality and quantity, we can manage the atmosphere or create a microclimate conditions; however this is not possible on a regional scale because air is continuous in motion.

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- ◆ **Water and its cycle:**
- ◆ This is another type of a non-critical zone resource which is in exhaustible.
- ◆ Water in its cycle involves rainfall, run-off, circulating ground water, ocean, seas,, lakes, rivers etc.
- ◆ Together, they constitute an inexhaustible supply of water.

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- ◆ Though water covers about three-quarters of the earth's surface, we do, occasionally experience shortages.
- ◆ Rough terrain, insufficient road network and harsh climate make water more precious than gold.
- ◆ In addition, most of the equipment needed to tap portable water is too costly and too difficult to operate and maintain.

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- ◆ **Tidal energy:**
- ◆ Tidal energy is a means of generating electricity achieved by capturing the energy contained in moving water mass due to tides.
- ◆ Two types of tidal energy can be extracted: **kinetic energy** of current and **potential energy** from the difference in height between high and low tides.

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- ◆ Tidal power is considered as renewable source of energy, because tides are caused by the orbital mechanics of the solar system.
- ◆ It is also considered to be inexhaustible because tides always rise and fall due to gravity.

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- ◆ **Human power:**
- ◆ It is obvious that human powers such as strength, dexterity and the physical skill which may be grouped as “powers of the body” are crucially important.
- ◆ These powers are capable of being renewed and maintained and may be considered as the greatest of all natural resources.

Non-renewable “renewable” resources

- ◆ **3.4 When are renewable resources not renewable?**
- ◆ Below are some of these resources:
- ◆ **Fresh water:**
- ◆ when fresh water gets used up, and no rain falls for a very long time, its supplies will be limited.

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- ◆ **Trees:**
- ◆ when a forest of trees are cleared, it can change the soil and the climate of the ecosystem, so that new trees cannot grow, plants die and animals lose their habitat.

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- ◆ **Oxygen/clean air:**
- ◆ when forests and plants are destroyed or die from acid rain pollution, they can no longer absorb carbon dioxide from the air, nor release oxygen into the atmosphere.

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- ◆ **Land/soil:**
- ◆ when land is over grazed, or the nutrients in the soil is used up from improper farming methods, the soil cannot renew itself and plants and crops cannot grow.

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- ◆ **Fish:**
- ◆ when land is cleared of vegetation in watershed areas that drain into rivers, lakes, streams, estuaries etc. soil erodes into the water and the silt smothers the fish and plant life.
- ◆ When pollutant drain into this waters, the toxic kill aquatic life and the pollutants can be carried through the water to far distance.

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- ◆ **Biospheres of living things:**
- ◆ when pollution destroys an area, like the devastating Exxon Valdez oil spillage that occurred in March 24, 1989, the whole biosphere is affected and all living things are damaged.
- ◆ It must be noted that nuclear contamination can last for longer than lifetimes.

SESSION 4: Other Types of Environmental Resources

- ◆ Environmental resources can be classified in various ways:
 - Whether they are scarce or abundant;
 - Whether they are widespread or localised in occurrence;
 - Whether they are exhaustible or renewable;
- ◆ The simplest and the most common division is into renewable and non-renewable resources, alternatively we have flow and fund(stock) resources.

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- ◆ Between these classification: renewable and non-renewable lie other categories of resources that are hard to classify.
- ◆ For example how should **metal ores** (metal ores are the minerals from which metals are extracted) be classified.
- ◆ At first they seem to be clear examples of non-renewable resource because the parent ores from which the metals are extracted exists as stocks and can be mined only once.

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- ◆ But, the refined metals can thereafter be recycled as scrap.
- ◆ In effect, the resource products are renewable, even though the parent ores are not.

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- ◆ Land is also difficult to accommodate in the simple framework of renewable or non-renewability.
- ◆ Land can be useful or valuable in many different ways.
- ◆ It may offer sites for building houses and factories-in this sense it would seem to be a **stock** (non-renewable)resource.
- ◆ The land, however is not permanently consumed.

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- ◆ The space provided by the land cannot be destroyed-in this sense, land seemed to be a renewable.
- ◆ It also give rise to stream of products such as food and wood, and in this function, it seems to be a flow resource.

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- ◆ **4.2 Land, the Basic Resource:**
- ◆ Land as a renewable resource is only on a condition that it is managed well.
- ◆ So also is the sea, as a fisheries resource. Over fishing can threaten the renewability of the resource and the result may be that in practice, it resembles a fund resource.

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- ◆ **4.3 Some tangible and intangible resource:**
- ◆ Aesthetic and recreational resources are especially difficult to accommodate in the general resource classification.
- ◆ It may be possible in some cases to restore damaged landscape or the quality of air or water and hence such resources may be potentially renewable.

SESSION 5: ENVIRONMENTAL RESOURCE IN SPACE AND TIME

- ◆ **5.1 Where are resources found?**
- ◆ In the past, people could only look to local environment for resources, but today world-wide systems of supply exist for many resource products.
- ◆ Once, we were “ecosystem” people, drawing resources from the local ecosystem.
- ◆ Now, resources could be drawn from around the world.

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- ◆ **5.2 A spatial Taxonomy of Resources:**
- ◆ Some natural resources are strongly localized, while others are widespread or even ubiquitous (existing everywhere).
- ◆ The atmosphere and its oxygen are literally ubiquitous, while the ocean is widespread.
- ◆ Ubiquitous occur everywhere while commonalties occur in many and widespread areas e. g is arable lands and forests.

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- ◆ This classification however tends to over simplify.
- ◆ One complicating factor is that the earth's surface is almost continuously variable
- ◆ Some mineral deposits for example may be rarities, but the metallic elements they contain may be quite common and widely distributed.

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- ◆ What is rare, therefore is not dependent on the presence of the material, but the degree of concentration of the metallic element in the deposit, and hence its ease of working.
- ◆ In the same way, a commonality such as arable land or forest may not be homogenous throughout its extensive occurrence.
- ◆ Some areas are likely to be fertile and productive than others.

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- ◆ Arable land is broadly defined by limits of temperature, rainfall, soil and terrain
- ◆ But within these broad limits there is a “highly productive” optimal or core areas surrounded by marginal zone of less productive land.
- ◆ In the optimal areas, cost of production is relatively low as compared to the less productive zones.

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- ◆ **5.3 Location and Resources:**
- ◆ Commonalty and rarity are therefore not necessarily constant, unchanging characteristics of resources.
- ◆ A further complication arises in that place or location is of primary significance in determining whether part of the natural environment is a resource.

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- ◆ Location constraint may exist as well as environmental constraints.
- ◆ Suppose two identical potentially cultivable land exist in different part of a town. One is located in a populated area, well served by transport links.
- ◆ The other is in remote and inaccessible part of the town.
- ◆ Obviously the former is more likely to be considered a resource than the other.

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- ◆ If a potential product is sufficiently valuable or attractive, then the resource may be utilized even if formidable barriers of remoteness and inaccessibility have to be overcome.
- ◆ For example, the discovery of a mineral deposit in a thick forest.
- ◆ This may involve the costly construction of new roads or railways into previously inaccessible hinterland.

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- ◆ **5.4 Mobile Resource and Mobile Humans:**
- ◆ A particular group of environmental resource is characterized by mobility or migration.
- ◆ Certain fish species, such as the Atlantic salmon, undertake long distance migration and spend different part of their life cycles in different environment.
- ◆ Certain bird species also migrate over long distance

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- ◆ These mobile resources pose the problem of management.
- ◆ Private ownership and management cannot be easily applied.
- ◆ Similarly, management of rivers that cross international boundaries is especially difficult.
- ◆ Some resource users are nomadic (i.e moving from place to place in search of food, water and pasture for their livestock)

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- ◆ Others are temporary visitors.
- ◆ A more modern form of mobile resource users is represented by climbers; those seeking wilderness experience and also by tourists.
- ◆ In the past humans were restricted to local areas in search of natural resources for consumption,

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- ◆ But today, because of advancement in technology and improvement in transport system, we can move freely to every part of the world in search of natural resources.
- ◆ In effect, the spatial restriction on natural resources have been minimized.

SESSION 6: RESOURCE CREATION AND DESTRUCTION

- ◆ **6.1 Resource Creation:**
- ◆ At some point in time, a component of the environment that was not previously viewed as useful or valuable may eventually become a resource.
- ◆ This change may follow from broad cultural or societal trends.
- ◆ It may also arise from a more sudden changes in technology, allowing previously invaluable resource becoming useful

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- ◆ Some resources are suddenly and abruptly perceived as such.
- ◆ More generally, the recognition of resource is slower and more gradual process:
 - Initially, its usefulness is realized, but the technical feasibility and utilization may be costly.
 - Then with technological improvement, its cost of production starts falling.
 - The benefit of the resource being useful to mankind or society.

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- ◆ **6.2 Destruction of Resource:**
- ◆ If resources can be created by changing perceptions, they can also be destroyed or have their value being reduced in the same way.
- ◆ They can also be destroyed by changing technology.
- ◆ When they are used up and cease to exist thus becoming exhaustible.

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- ◆ Other forms of resource destruction is degradation e.g poor farming practices that exposes a piece of land to erosion
- ◆ Similarly, material may be taken from a resource at a rate faster than it can be replenished by natural biological means, for example through hunting and fishing.

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- ◆ **6.3 Resource “Expansion” and “Shrinking” Phenomenon:**
- ◆ In our previous discussions, we have learnt that resources expand with every advancement in human knowledge, changing perceptions and improvements in technology.
- ◆ Likewise, they also shrink when they fall into disuse.

End of Unit 2

Thank you for your co-operation

Please read Unit 3 in readiness for next FTF.

Bye bye