The Valuable Natural Resources of the World, Economic Growth & The Global Environment

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Abstract **- Natural resources are usually either renewable or non-renewable. The former refer to those resources that can renew themselves in time. These include living resources like forests or non-living ones like wind, water, solar energy. Non-renewable resources, as the name implies, are those that can no longer be tapped once the available stock at a site is exhausted. Once we use them, there isn't any more. Mineral resources are non-renewable. Fossil fuels, which are formed from the fossilized remains of prehistoric organisms, are also considered non-renewable even though they can renew themselves given a few million years. For more on fossil fuels and why they are so-called, Fossil fuels currently account for about 90 percent of the world's energy consumption. They provide around 66% of the world's electrical power, and 95% of the world's total energy demands, such as, for heating, transport, electricity generation and so on. In many developing countries, biomass remains the primary energy source for much of the population.Renewable sources have the advantage of producing lower emissions of carbon dioxide, and reducing reliance on fossil fuels. The use and conservation of natural resources such as water, land, soil, plants, and animals affects a multitude of industries, from agriculture and mining to tourism, fishing, and forestry. Managing and sustaining the eco-systems, natural resources and environmental services are essential for wealth and development. Environmental studies refer to an extensive and systematic study of nature/environment, its physical, biological, social, and cultural factors, as well as the nature and characteristics of the relationship between man and environment. Environmental studies help us understand the importance of our environment and teaches us to use natural resources more efficiently and embrace a sustainable way of living.**

keywords **- Natural Resources, Economic Growth, Global Environment**

1. Introduction

A resource is defined as anything having physical or virtual entity of limit. availability , that might be consumed in and get benefits from it The term resource is derived from two words means again and source' means the place from where something comes again and again. The sum total of physical , chemical , biological and social factors which compose the surroundings of a man is referred to as environment and each element of these surroundings constitute a resource. Any stock or reserve that can be drawn from nature is **natural** resource.
E.g :soil , water , air , coal , forest , crops , etc.

The environment is everything which surrounds on organism and influences its life in many ways. It includes physical and biological components. The physical components of the environment are soil, water, air, light and temperature (Abiotic components). The plants and animals are collectively referred to as Biotic components. All these components work together, interact and modify the effect on one another. The basic need of life are fulfilled by minerals present in the nature. These are referred to as Natural Resources.

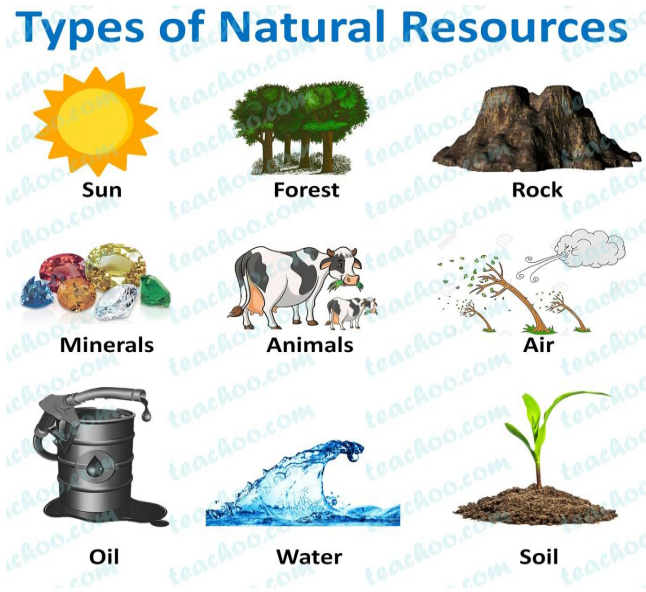
Natural resources are a variety of goods and services provided by nature which are necessary for our day-to-day lives like plants, animals and microbes (living or biotic part), air, water, soil, minerals, climate and solar energy (non-living or abiotic part), growth of plants in forests, grasslands and ecosystem.

Natural resources comprise of water, soil, minerals, vegetation, animals, air, and sunlight. People require **resources** to survive and succeed. Everything which happens naturally on earth are **natural resources** that is minerals, land, water, soil, wind that can be used in many ways by human being.

2. Classification of Natural Resources

1. **On the basis of Origin**
   - **Biotic**: Biotic resources come from the biosphere (living and organic material). Examples – forests and animals, and the materials that can be obtained from them. As fossil fuels such as coal and petroleum are formed from decayed organic matter, they are also included in this category.
   - **Abiotic**: Abiotic resources come from non-living, non-organic material. Examples – land, fresh water, air, rare-earth elements, and heavy metals including ores, such as gold, iron, copper, silver, etc.
2. **On the basis of the Stage of Development of Natural Resources**
   - **Potential resources:** Potential resources are those that can be used in the future. Example – petroleum in sedimentary rocks until drilled out and put to use, remains a potential resource.
   - **Actual resources:** Resources that have been surveyed, quantified and qualified and are currently in use. Examples – wood processing, which depends on technology and cost.
   - **Reserve resources:** Forming part of an actual resource that can be developed in the future.
   - **Stock resources:** Resources that have been surveyed, but due to lack of technology, cannot be put to use. Example – hydrogen.
3. **On the basis of Recovery Rate**
   - **Renewable resources:** Resources that can be replenished naturally are renewable resources. The resources, like wind, sunlight, air, water, etc. are abundantly available and their quantities are hardly get affected by human consumption. From a human use perspective, resources are said to be renewable as long as the rate of replenishment/recovery exceeds the rate of consumption. They replenish easily compared to non-renewable resources.
   - **Non-renewable resources:** Non-renewable resources either do not naturally form in the environment or form slowly. Minerals, the most common resource, fall in this category. From the human perspective, the rate of consumption of non-renewable resources exceeds the rate of replenishment/recovery. Example – fossil fuels, the rate of formation of fossil fuel is extremely slow (potentially millions of years).

Some resources naturally deplete without human interference, such as radio-active element uranium that naturally decays into heavy metals. Out of these, the metallic minerals are the ones that can be reused through recycling. However, coal and petroleum cannot be recycled. These resources take millions of years to replenish once they are fully used.



3. List of Natural Resources in the World

Here are the **top natural resources in the world**, how they are already in danger from the current demands placed on them, and how conservationism can help to manage these resources so that they don't disappear. Using alternate resources is one thing that will help; creating better resource management plans is what will also help to preserve these resources for the future.

The list of Natural Resources include:

1. Water
2. Air
3. Land
4. Soil
5. Oil
6. Natural gas
7. Salt
8. Forests and Timber
9. Grassland, Plants
10. Crops and Cultivation
11. Rivers & Oceans
12. Sunlight/Solar Power
13. Climate & Weather
14. Wind Energy
15. Fossil Fuels
16. Animals
17. Coal
18. Petroleum
19. Hydrogen
20. Minerals
    1. Iron
    2. Copper
    3. Silver
    4. **Steel**
    5. **Aluminium**
    6. Phosphorus
    7. Bauxite
    8. Helium
    9. Gold
    10. Uranium
    11. Other Minerals

4. Water as Natural Resource

The planet's renewable fresh water is finite—10,000 cubic miles' worth is available each year on average—and constraints on its availability and use are increasingly evident. The growth of the human population inevitably limits the average availability fresh water per person, and the growing human thirst for fresh water comes at the expense of natural ecosystems and threatens the survival of animal and plant species.

1. **The Hydrosphere:** All H2O at or near earth**?**s surface.

- 97.5% is in the oceans.
- 1.8% is in ice or snow.
- 0.7% is freshwater (98% of that is groundwater, the largest source of fresh, liquid water).
- A very tiny fraction is in the atmosphere as water vapor and in surface streams or lakes.

All water moves between these reservoirs. A slow rate of exchange on a human time scale. Therefore, water is considered a non-renewable resource in the short term.

Scarcity of water often leads to political conflicts. Much of the conflict between the Israelis and the Palestinians is over water rights. May be easier to settle the land issues than the water issues, since much of the water supply in the area comes from underground and can't be seen directly.

2. Ground water: Water in the **zone of saturation**. Lies beneath **the zone of aeration** (**vadose zone or soil moisture**).

The **water table** is the top surface of the zone of saturation. It fluctuates with topography (may be higher than elevation of land such as at a lake) and with rate of recharge (infiltration from surface plus migration in from side) versus rate of discharge (loss due to pumping and migration out). Varies with changes in seasonal or daily precipitation.

- Ground water is the most important source of fresh water today, not surface waters (lakes and rivers). Supplies 34 out of 100 largest U.S. cities. Why?
- Precipitation varies dramatically, particularly in arid areas where little or no surface water exists.
- Surface water often polluted.
- Often naturally filtered
- Largest available source of fresh, liquid water.

Large volumes of ground water require an **aquife**r that holds and transmits the water. Material has a high porosity and permeability. Usually a well-sorted sediment rock or sedimentary rock). Flow rates of 1-100 meters per day for sand and sandstone and 100-500 per day for gravel or conglomerate are typical.

1. Aquifer Types

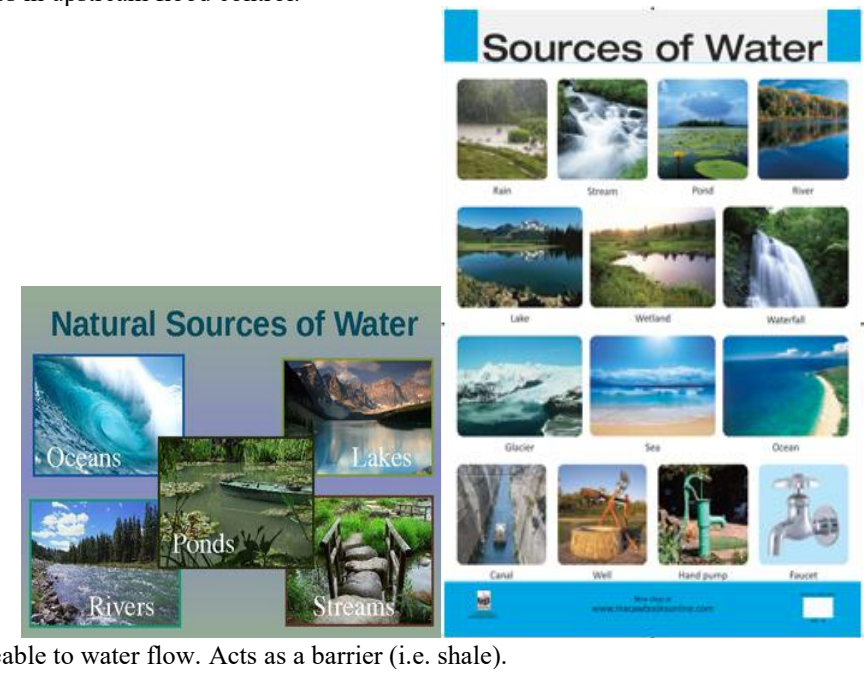
Unconfined: no confining aquiclude on top of aquifer. Water is not under any pressure. Aquifer is open to surface waters (and pollution) throughout its entire area. Usually is regional in extent (100s of square miles or more).

Perched water table: localized (10s of square miles or less) unconfined aquifer usually at a shallower depth than the regional aquifer. Caused by underlying aquiclude of limited extent. Cheaper to exploit, but can be quickly depleted and is more sensitive to local precipitation and pollution.

Confined of artesian: overlain by an aquitard or aquiclude. Water movement restricted to the sandwiched aquifer. Water usually under pressure due to its own weight (hydrostatic head). If drilled, water will rise to the **potentiametric surface**. This surface decreases in altitude with distance from the recharge area because of loss of ability to due work due to friction. Most municipal water supply systems are synthetic artesian systems. Due to overlying confining layer, confined aquifers are less susceptible to pollution over most of their area. However, in the restricted recharge area, the aquifer can be greatly impacted by local pollution and the reduction of water infiltration due to urbanization.

Urbanization cuts recharge rates by covering the recharge area with impermeable material (asphalt, concrete), particularly for confined aquifers were recharge area is small.

Problem can be corrected by building retention basins to hold the water in place for a time and allow it to percolate into the ground. This also helps in upstream flood control.



Aquiclude: impermeable to water flow. Acts as a barrier (i.e. shale).

Aquitard: intermediate condition

1. **Consequences of Excessive Ground Water Withdrawal**

If rate of water extraction is greater than rate of recharge a **cone of depression** develops in the water table around the extraction well. Depth of the cone is greatest at the well. The difference between the elevation of the regional water table outside the cone of depression and the water level in the well is known as the **drawdown**.

Bigger drawdowns occur in aquifers of lower permeability. Nearby shallower wells may dry up unless they are drilled deeper. Overlapping cones of depression can cause a regional lowering of the water table causing many wells to dry up. May require 10-100's of years after the water withdrawal stops before recharge raises the water table and allows the wells to be used again.

1. Cones of depression may locally reverse the direction of ground water flow. May impact the contamination of local water supply.
2. If a lowering of the water table empties an underground cavern (usually in limestone), roof of cavern is left unsupported and it may collapse. Forms a surface depression or **sinkhole**. These may be 1000's of feet across and 10's of feet deep and cause drastic property damage.
3. Large areas of land may subside as water is removed from pore spaces between grains. Large problem in Houston, New Orleans, coastal New Jersey, California, and Venice.
4. As water is removed compaction of the aquifer occurs. Porosity and permeability may be permanently reduced. Aquifer may now become an aquitard.
5. In coastal areas freshwater withdrawal may be replaced by saltwater recharge. Causes **saltwater intrusion** into the aquifer. Makes aquifer and any wells tapping it useless. This is a large problem on Long Island, coastal New Jersey, Gulf Coast, and California.
6. May cause a stream to switch from being effluent (gaining ground water) to influent (losing water). Polluted surface streams may now pollute ground water.

2. **U.S. Water Supply**

- ✓ 4.2×10^{12} gallons per day fall as precipitation. 2.8×10^{12} gallons per day lost back to the atmosphere because of evaporation and transpiration. Therefore, 1.4×10^{12} gallons per day is potentially available for use. However, much of this is lost because of pollution streams and surface runoff (lost to surface streams and enters ocean). Also much of it falls were it is not needed.
- ✓ 4.5×10^{11} gallons per day is used. This represents approximately 1800 gallons per person per day in the U.S. Most of this is used for industry or agriculture. Each of us is personally responsible for about 150 gallons per day (home and work usage). Only about 1 gallon per person per day is needed to sustain human life.
- ✓ Only 1×10^{11} gallons per day is consumed. The rest is returned to the hydrosphere, although often in a polluted (chemically, physically, or thermally) form.

3. **U.S. Water Uses**

1. Hydroelectric generation
2. Public (municipal) water supplies
3. Rural (individual) water supplies
4. Irrigation - biggest **consumer** of water. Causes the biggest depletion of ground water supplies and lowering of water tables. An example is the Ogallala Aquifer. Water table has decreased 100+ feet in some areas. Lowering 0.5 to 3 inches per year now. May have 40-50 years of usable water left in some areas. There are no cheap alternative sources of water. Will make crops grown from expensive water more expensive themselves. Problem will only get worse due to global warming.
5. Industrial - biggest **user** of water. Most water is returned to the hydrosphere.

4. **Extending Water Supplies**

1. **Conservation:** Use less water for many activities. Use high efficiency appliances. Cut down on irrigation or make it less susceptible to evaporation by using drip irrigation techniques. Biggest saving would come in the agricultural area.
2. **Interbasin Water Transfer:** Move water from where it is plentiful, but not used to areas where it is used, but not plentiful. Often draw on very distance sources, such as the municipal water supplies for Los Angeles and New York City. They get their water from 100s of miles away. May have to do this in the Midwest where water could be piped in from Canada. It will cost billions of dollars to build such an extensive water distribution system. Transfer of large volumes of water may have a very negative environmental impact on the source. For example, there is now more demand for Colorado River water than the river can supply. As a result the river dries up entirely it enters Gulf of California. Often there are legal questions as to whose water it is.
3. **Desalination:** Turn salty ocean water in to fresh water. Two methods to do this:

- ✓ **Filtration** - relatively cheap process, but can only process limited amounts of water. Good process for individual homes or factories and small towns.
- ✓ **Distillation** - Evaporate large quantities of salt water and then precipitate the water vapor as fresh water. Can be powered by burning fuels or solar energy. Used extensively in Saudi Arabia and other desert environments. Very expensive technology with the derived water costing 5-15 times more than naturally fresh water. Food grown will cost 2-5 times as much.

We are reaching the limit of our water supplies in some locations in this country and around the world. Where are we going to find more and at what cost, both economically and environmentally?

In the past, water scarcity was at most a local or temporary problem, but it is now becoming pervasive and persistent in some regions of the world.

- ⁂ Desalination is too labor- and energy-intensive to add much to the world's supply of fresh water or to contribute to the availability of fresh water for agriculture.
- ⁂ Pricing water appropriately can encourage more efficient use, but much of the world's use of water is not even metered and will be difficult to price.
- ⁂ Even if technologically feasible, any solution to water shortages that involves moving massive amounts of water over long distances would have major impacts on the environment, altering or destroying wetlands and riparian habitats essential to the survival of other species.

In 1995, about 386 million people in 31 countries lived in conditions of water stress or water scarcity, based on hydrological benchmarks of the minimum annual per capita availability of renewable fresh water needed for economic development. By 2020 the number of people living in such conditions could be as high as 2.9 billion or as low as 1.2 billion, depending on the rate of population growth over the next 24 years. By one recent estimate, more than half of all the world's accessible renewable fresh water is already being used, indicating the problems the world may face if population doubles.
Lack of water is already a problem in densely populated urban environments such as Mexico City and Beijing. This is not just a developing world problem. Rapidly growing cities in Texas, California, Florida, Arizona and Nevada are finding that the availability of renewable fresh water is constraining their prospects for continued growth.
Fresh water is essential for farming, for industry, for human health and life itself. Every living being on land and in lakes and rivers requires it, and the more water humans use the less remains for these nonhuman species, many of them already threatened by habitat loss

Water Source	**% of total water**
Oceans	**97.24%**
Icecaps, glaciers	**2.14%**
Ground water	**0.61%**
Fresh-water lakes	**0.009%**
Inland seas	**0.008%**
Soil moisture	**0.005%**
Atmosphere	**0.001%**
Rivers	**0.0001%**

Water pollution

1. occurs when some substance degrades a body of water to such a degree that water cannot be used for a specific purpose
2. Major pollutants:
   - ➢ disease-causing agents, such as bacteria
   - ➢ oxygen-demanding waste - organic wastes decomposed by aerobic bacteria
   - ➢ water-soluble inorganic chemicals - acids, salts, mercury, & lead
   - ➢ inorganic plant nutrients
     - ✓ Nutrients such as phosphorus & nitrogen in the form of fertilizers, manure, sludge, irrigation water, legumes, and crop residues are applied to enhance agricultural production. When they are applied in excess of plant needs, nutrients can wash into aquatic ecosystems where they can cause excessive plant growth, which reduces swimming and boating opportunities, creates a foul taste and odor in drinking water, and kills fish. Farmers can implement nutrient

management plans which help maintain high yields and save money on the use of fertilizers while reducing NPS pollution.

- organic chemicals - oil, gasoline, & pesticides
  - Silt in the water can damage some fish's gills and make breathing difficult.
  - Cloudy water also absorbs more sunlight than clear water. This may raise the water temperature. A temperature that's too high can stress or kill aquatic organisms.
  - Silt that settles to the stream bottom is known as sediment. Fish find some of their food (like aquatic insects) on stream bottoms. An increase in sediment can kill aquatic insects by suffocating them.
  - Sediment can also smother fish eggs and alter natural repopulation patterns. It can also fill in the living spaces and destroy habitat.

Water pollutants vary in degree to which they're degradable by natural processes:

- non-persistent pollutants
  - Sewage, fertilizers, and some household cleaning products are examples of non-persistent or degradable pollutants. They are generally less harmful because they can eventually be broken down and their damaging effects can be reversed.
- persistent pollutants
  - degrade slowly and remain in the water for years. They may bioaccumulate up the aquatic food chain, exposing animals, birds, and people who eat fish to unacceptably high concentrations of chemicals. This can result in animal and human health risks and in serious environmental damage.
  - include some pesticides, oil, or specific compounds of oil, and metals such as cadmium, lead, and mercury.

Sources of water pollution:

- Point sources vs. non-point sources
  - Point sources include sewage-treatment plants, industrial plants, and animal feedlots
  - Non-point sources
    - Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water.
    - agriculture is the leading contributor to water quality impairments, degrading 60% of the impaired river miles and half of the impaired lake acreage surveyed by states, territories, and tribes. Runoff from urban areas is the largest source of water quality impairments to surveyed estuaries.
    - The most common NPS pollutants are sediment and nutrients. These wash into water bodies from agricultural land, small and medium-sized animal feeding operations, construction sites, and other areas of disturbance. Other common NPS pollutants include pesticides, pathogens (bacteria and viruses), salts, oil, grease, toxic chemicals, and heavy metals.
    - Beach closures, destroyed habitat, unsafe drinking water, fish kills, and many other severe environmental and human health problems result from NPS pollutants. The pollutants also ruin the beauty of healthy, clean water habitats.

Waste-water treatment:

1. **Screening.** Wastewater entering the treatment plant includes items like wood, rocks, and even dead animals. Unless they are removed, they could cause problems later in the treatment process. Most of these materials are sent to a landfill.
2. **Pumping.** The wastewater system relies on the force of gravity to move sewage from your home to the treatment plant. So wastewater-treatment plants are located on low ground, often near a river into which treated water can be released. If the plant is built above the ground level, the wastewater has to be pumped up to the aeration tanks (item 3). From here on, gravity takes over to move the wastewater through the treatment process.
3. **Aerating.** One of the first steps that a water treatment facility can do is to just shake up the sewage and expose it to air. This causes some of the dissolved gases (such as hydrogen sulfide, which smells like rotten eggs) that taste and smell bad to be released from the water. Wastewater enters a series of long, parallel concrete tanks. Each tank is divided into two sections. In the first section, air is pumped through the water. As organic matter decays, it uses up oxygen. Aeration replenishes the oxygen. Bubbling oxygen through the water also keeps the organic material suspended while it forces 'grit' (coffeegrounds, sand and other small, dense particles) to settle out. Grit is pumped out of the tanks and taken to landfills.
4. **Removing sludge.** Wastewater then enters the second section or sedimentation tanks. Here, the sludge (the organic portion of the sewage) settles out of the wastewater and is pumped out of the tanks. Some of the water is removed in a step called thickening and then the sludge is processed in large tanks called digesters.
5. **Removing scum.** As sludge is settling to the bottom of the sedimentation tanks, lighter materials are floating to the surface. This 'scum' includes grease, oils, plastics, and soap. Slow-moving rakes skim the scum off the surface of the wastewater. Scum is thickened and pumped to the digesters along with the sludge. Many cities also use filtration in sewage treatment. After the solids are removed, the liquid sewage is filtered through a substance, usually sand, by

the action of gravity. This method gets rid of almost all bacteria, reduces turbidity and color, removes odors, reduces the amount of iron, and removes most other solid particles that remained in the water. Water is sometimes filtered through carbon particles, which removes organic particles. This method is used in some homes, too.

6. **Killing bacteria.** Finally, the wastewater flows into a 'chlorine contact' tank, where the chemical chlorine is added to kill bacteria, which could pose a health risk, just as is done in swimming pools. The chlorine is mostly eliminated as the bacteria are destroyed, but sometimes it must be neutralized by adding other chemicals. This protects fish and other marine organisms, which can be harmed by the smallest amounts of chlorine. The treated water (called effluent) is then discharged to a local river or the ocean.
7. **Wastewater Residuals.** Aother part of treating wastewater is dealing with the solid-waste material. These solids are kept for 20 to 30 days in large, heated and enclosed tanks called 'digesters.' Here, bacteria break down (digest) the material, reducing its volume, odors, and getting rid of organisms that can cause disease. The finished product is mainly sent to landfills, but sometimes can be used as fertilizer.

Freshwater Ecosystems

Wetlands:

- once considered useless, disease-ridden places (e.g., malaria and yellow fever)
- provide many benefits to society:
  - fish and wildlife habitats
  - natural water quality improvement
  - flood storage
  - shoreline erosion protection
  - opportunities for recreation and aesthetic appreciation
- among the most productive ecosystems in the world, comparable to rain forests and coral reefs. They also are a source of substantial biodiversity in supporting numerous species from all of the major groups of organisms – from microbes to mammals.

Lakes

1. Divided into zones based on photosynthetic activity & proximity to bottom:
2. **Littoral Zone:** light penetrates to the bottom, allowing aquatic plants to grow
3. **Limnetic Zone:** the open water area where light doesnot generally penetrate all the way to the bottom
4. **Euphotic Zone:** the layer from the surface down to the depth where light levels become too low for photosynthesis
5. **Benthic Zone:** the bottom sediment

- Major threats to our lakes:
  - An overabundance of nutrients. This leads to algal blooms and excessive plant growth which ultimately deplete oxygen supplies for fish and some other aquatic life.
  - An overabundance of sediment. This "runoff" soil can fill lakes and destroy habitat for plants and animals, as well as clog fish gills and smother fish eggs.
  - Metals and other organic chemicals such as polychlorinated biphenyls (PCBs), contaminating fish and shellfish.

- Sources of lake pollution:
  - ✓ Agricultural management practices can lead to pollutants like nitrogen, phosphorous, sediment, & pesticides and entering a lake.
  - ✓ Runoff from pavement and lawns in urban areas picks up oil, metals, bacteria (including *E. coli*), nutrients, and transports them through the storm sewer system.
  - ✓ Septic systems also contribute to lake pollution when they leak into the shallow groundwater. This can also increase the load of nutrients, bacteria (including *E. coli*) and other organic wastes.

Oceans

- ✓ 70% of the earth's surface
- ✓ Zones:

The ocean bottom is the **benthic zone** and the water itself (or the water column) is the **pelagic zone**. The **neritic zone** is that part of the pelagic zone that extends from the high tide line to an ocean bottom less than 600 feet deep. Water deeper than 600 feet is called the **oceanic zone**, which itself is divided on the basis of water depth into the epipelagic, mesopelagic, and bathypelagic zones. These zones roughly correspond to the three other zones divided on the basis of the amount of sunlight they receive. In the **sunlit zone**, enough light penetrates to support photosynthesis. Below that lies the **twilight zone**, where very small amounts of light penetrate. Ninety percent of the space in the ocean lies in the **midnight zone**, which is entirely devoid of light.

Two important communities found in the neritic province are:

- Tidal marshes & estuaries
  - a partially enclosed body of water formed where freshwater from rivers and streams flows into the ocean, mixing with the salty sea watere
  - among the most productive ecosystems on earth, creating more organic matter each year than comparably-sized areas of forest, grassland, or agricultural land

- provide habitat for more than 75% of America's commercial fish catch, and for 80-90% of the recreational fish catch

✓ Coral reefs
- cover less than 1% of the planet's surface
- the world's most biologically diverse marine ecosystems
- Reef ecosystems are now being rapidly degraded & destroyed worldwide due to:
  - increased sediments in the water
  - trampling by tourists and divers
  - ship groundings, pollution, overfishing
  - fishing with poisons and explosives that destroy coral habitat

Environmental problems facing our oceans:
- Whaling
- Incidental take or bycatch
  - ✓ the unintended catch of animals associated with commercial fishing operations, the vast majority of which is discarded back into the ocean already dead or dying.
  - ✓ Bycatch is pervasive the world's fisheries. It includes undersized or juvenile fish of targeted species as well as non-target species of fish, turtles, marine mammals, birds, and other wildlife.
- Tuna/dolphins
- Overfishing

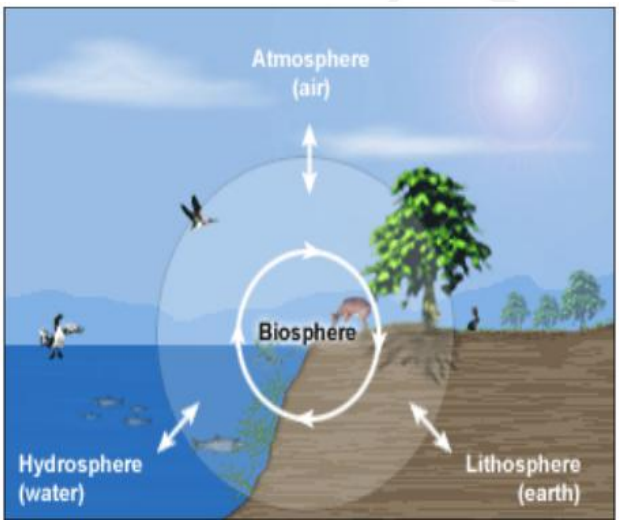
5.Air as a Natural Resource

Air is a wonderful and precious natural resource gifted by the almighty. It is the main natural source which helps all life to sustain on this Mother Earth. The Earth's atmosphere is made up of different gases that keep plants, animals and people alive. The composition of air in the atmosphere is – Nitrogen-78.09%, Oxygen – 20.94%, Argon – 0.03%, Carbon dioxide 0.03%, Water vapor, Helium, Krypton, and Xenon etc. Let us discuss the importance of air being a natural resource

Importance of Air which is a Natural Resource : The air we breathe in keeps us alive, as well as performs many other functions. Adults breathe in about 10 – 20 cubic meter of air every day. Oxygen is the most important gas of air and an average human being needs 600 quarts of Oxygen daily. The Oxygen- Carbon dioxide cycle is of fundamental importance to animal-plant relationships. The Oxygen is produced by Plant Photosynthesis which has been taking place for millions of years. Plants produce its food by the help of carbon dioxide given out by human beings. In addition to this, air serves a number of other functions like generating power through wind mills, suspends clouds and helps in raining; Compressed air is used in many industries and automobiles etc.

This precious natural resource in recent time has been polluted due to various reasons. The air pollution has risen due to the emission of smoke, sulphur dioxide, Nitrogen oxides, carbon monoxides etc. Acute air pollution occurs when there is a dispersal of pollutants in the atmospheres.

Main Causes for Air Pollution : Smoke emitted from industries and vehicles De Forestation Higher population Seasonal Influence Smoke and ash due to Volcanic eruption It is obvious that Pollution in Air has an adverse effect upon the health of all living beings. Acidity of rain water and the deposition of solids on the leaves of the plants are also the effects of air pollution.It is our duty to preserve air which is an important natural resource. Regular Emission tests of vehicles, planting of trees in affected areas etc. will help us to control air pollution to an extent.Without air there would not be any survival.



Air is precious; Preserve it!

6. Land as Natural Resource

Land resources mean the **resources** available from the **land**, thus the agricultural **land** which contain natural fertilizer for growth of the products sown; the underground water, the various minerals like coal, bauxite, gold and other raw materials

Land resources includes natural **resources** for an **example** - gold , timber , coal , iron ore , uranium, oil, water , soil , air , plants, and animals

Land and water **resources** are essential for farming, grazing, forestry, wildlife, tourism, urban development, transport infrastructure, and other environmental functions. The increasing demand for **land**, coupled with a limitation in its supplies, is a major cause for more conflicts over **land use** throughout the world.

Among **land** under cultiva- tion, agricultural **land** and forestry **land**, the **two** largest **land types** in terms of area, cover 20.8 % and 64.2 % of total **land**, respectively.

The **different types of land** are known as biomes. These are divided into four classifications: desert, forest, grassland and tundra. **Land** biomes are typically defined by the **type** of vegetation they possess, the **types** of animals that inhabit them and their climate, such as rainfall and temperature.

There are seven types of **land** use: residential, agricultural - farmland, recreational - fun, non-essentials like parks. Transport - roads, railways, and airports, transportation, and commercial, roadside, park, and forest.. People should make sure they use **land** responsibly to respect other people and our environment.

Land is an essential **natural resource**, both for the survival and prosperity of humanity, and for the maintenance of all terrestrial ecosystems. ... Increased demand, or pressure on **land resources**, shows up as declining crop production, degradation of **land** quality and quantity, and competition for **land**.

Sustainable Land Management

- Maintain and enhance production (productivity)
- Reduce the level of production risk, and enhance soil capacity to buffer against degradation processes (stability/resilience)
- Protect the potential of natural **resources** and prevent degradation of soil and water quality (protection)
- Be economically viable (viability)

Land Conservation Benefits

- Protection of water resources.
- Providing open spaces and parks for our urban communities.
- Creating and enhancing outdoor recreation opportunities statewide.
- Preserving working farms and forests.
- Protecting wildlife habitat.

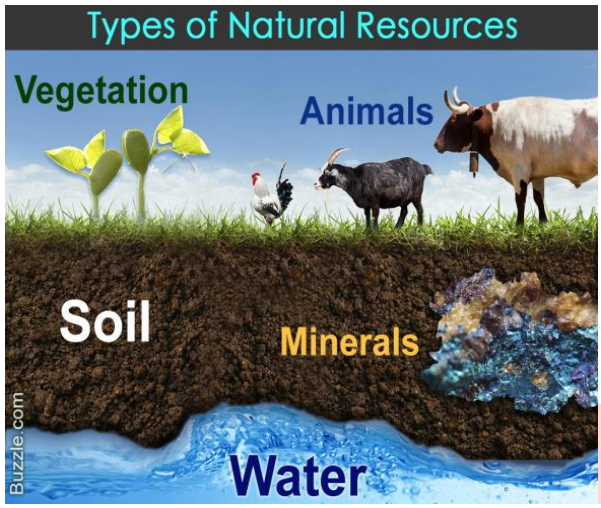
7. Soil as Natural Resource

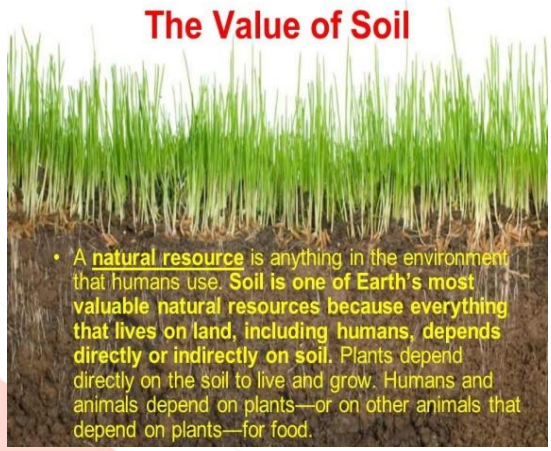
Soil Formation: How well soil forms and what type of soil forms depends on several different factors, which are described below.

Climate: Scientists know that climate is the most important factor determining soil type because, given enough time, different rock types in a given climate will produce a similar soil (**Figure** below). Even the same rock type in different climates will not produce the same type of soil. This is true because most rocks on Earth are made of the same eight elements and when the rock breaks down to become soil, those elements dominate.

Climate is the most important factor in determining the type of soil that will form in a particular area. The same factors that lead to increased weathering also lead to greater soil formation.

- More rain equals more chemical reactions to weather minerals and rocks. Those reactions are most efficient in the top layers of the soil, where the water is fresh and has not yet reacted with other materials.
- Increased rainfall increases the amount of rock that is dissolved as well as the amount of material that is carried away by moving water. As materials are carried away, new surfaces are exposed, which also increases the rate of weathering.
- Increased temperature increases the rate of chemical reactions, which also increases soil formation.
- In warmer regions, plants and bacteria grow faster, which helps to weather material and produce soils. In tropical regions, where temperature and precipitation are consistently high, thick soils form. Arid regions have thin soils.





Soil type also influences the type of vegetation that can grow in the region. We can identify climate types by the types of plants that grow there.

1. **Rock Type:** The original rock is the source of the inorganic portion of the soil. The minerals that are present in the rock determine the composition of the material that is available to make soil. Soils may form in place or from material that has been moved.
2. **Residual soils** form in place. The underlying rock breaks down to form the layers of soil that reside above it. Only about one-third of the soils in the United States are residual.
3. **Transported soils** have been transported in from somewhere else. Sediments can be transported into an area by glaciers, wind, water, or gravity. Soils form from the loose particles that have been transported to a new location and deposited.
4. **Slope:** The steeper the slope, the less likely material will be able to stay in place to form soil. Material on a steep slope is likely to go downhill. Materials will accumulate and soil will form where land areas are flat or gently undulating.
5. **Time:** Soils thicken as the amount of time available for weathering increases. The longer the amount of time that soil remains in a particular area, the greater the degree of alteration.
6. **Biological Activity:** The partial decay of plant material and animal remains produces the organic material and nutrients in soil. In soil, decomposing organisms breakdown the complex organic molecules of plant matter and animal remains to form simpler inorganic molecules that are soluble in water. Decomposing organisms also create organic acids that increase the rate of weathering and soil formation. Bacteria in the soil change atmospheric nitrogen into nitrates.

The decayed remains of plant and animal life are called **humus**, which is an extremely important part of the soil. Humus coats the mineral grains. It binds them together into clumps that then hold the soil together, creating its structure. Humus increases the soil's porosity and water-holding capacity and helps to buffer rapid changes in soil acidity. Humus also helps the soil to hold its nutrients, increasing its fertility. Fertile soils are rich in nitrogen, contain a high percentage of organic materials, and are usually black or dark brown in color. Soils that are nitrogen poor and low in organic material might be gray or yellow or even red in color. Fertile soils are more easily cultivated.

Soil Horizons and Profiles: A residual soil forms over many years, as mechanical and chemical weathering slowly change solid rock into soil. The development of a residual soil may go something like this.

- The bedrock fractures because of weathering from ice wedging or another physical process.
- Water, oxygen, and carbon dioxide seep into the cracks to cause chemical weathering.
- Plants, such as lichens or grasses, become established and produce biological weathering.
- Weathered material collects until there is soil.

➢ The soil develops **soil horizons**, as each layer becomes progressively altered. The greatest degree of weathering is in the top layer. Each successive, lower layer is altered just a little bit less. This is because the first place where water and air come in contact with the soil is at the top.

A cut in the side of a hillside shows each of the different layers of soil. All together, these are called a **soil profile**. Soil is an important resource. Each soil horizon is distinctly visible in this photograph. The simplest soils have three horizons.

1. **Topsoil:** Called the **A-horizon**, the **topsoil** is usually the darkest layer of the soil because it has the highest proportion of organic material. The topsoil is the region of most intense biological activity: insects, worms, and other animals burrow through it and plants stretch their roots down into it. Plant roots help to hold this layer of soil in place. In the topsoil, minerals may dissolve in the fresh water that moves through it to be carried to lower layers of the soil. Very small particles, such as clay, may also get carried to lower layers as water seeps down into the ground.
2. **Subsoil:** The **B-horizon** or **subsoil** is where soluble minerals and clays accumulate. This layer is lighter brown and holds more water than the topsoil because of the presence of iron and clay minerals. There is less organic material.

A soil profile is the complete set of soil layers. Each layer is called a horizon.

1. **C horizon:** The **C-horizon** is a layer of partially altered bedrock. There is some evidence of weathering in this layer, but pieces of the original rock are seen and can be identified. Not all climate regions develop soils, and not all regions develop the same horizons. Some areas develop as many as five or six distinct layers, while others develop only very thin soils or perhaps no soils at all.
2. **Causes of Soil Erosion:** The agents of soil erosion are the same as the agents of all types of erosion: water, wind, ice, or gravity. Running water is the leading cause of soil erosion, because water is abundant and has a lot of power. Wind is also a leading cause of soil erosion because wind can pick up soil and blow it far away. Activities that remove vegetation, disturb the ground, or allow the ground to dry are activities that increase erosion. What are some human activities that increase the likelihood that soil will be eroded?
3. **Farming:** Agriculture is probably the most significant activity that accelerates soil erosion because of the amount of land that is farmed and how much farming practices disturb the ground (**Figure** below). Farmers remove native vegetation and then plow the land to plant new seeds. Because most crops grow only in spring and summer, the land lies fallow during the winter. Of course, winter is also the stormy season in many locations, so wind and rain are available to wash soil away. Tractor tires make deep grooves, which are natural pathways for water. Fine soil is blown away by wind. The soil that is most likely to erode is the nutrient-rich topsoil, which degrades the farmland.
4. The bare areas of farmland are especially vulnerable to erosion. Slash-and-burn agriculture leaves land open for soil erosion and is one of the leading causes of soil erosion in the world.
5. **Grazing:** Grazing animals wander over large areas of pasture or natural grasslands eating grasses and shrubs. Grazers expose soil by removing the plant cover for an area. They also churn up the ground with their hooves. If too many animals graze the same land area, the animals' hooves pull plants out by their roots. A land is overgrazed if too many animals are living there.

Grazing animals can cause erosion if they are allowed to overgraze and remove too much or all of the vegetation in a pasture.

Logging and Mining: Logging removes trees that protect the ground from soil erosion. The tree roots hold the soil together and the tree canopy protects the soil from hard falling rain. Logging results in the loss of **leaf litter**, or dead leaves, bark, and branches on the forest floor. Leaf litter plays an important role in protecting forest soils from erosion

Logging exposes large areas of land to erosion.Much of the world's original forests have been logged. Many of the tropical forests that remain are currently the site of logging because North America and Europe have already harvested many of their trees. Soils eroded from logged forests clog rivers and lakes, fill estuaries, and bury coral reefs.

Deforested swatches in Brazil show up as gray amid the bright red tropical rainforest. Surface mining disturbs the land and leaves the soil vulnerable to erosion.

Disturbed land at a coal mine pit in Germany. (b) This coal mine in West Virginia covers more than 10,000 acres (15.6 square miles). Some of the exposed ground is being reclaimed by planting trees.

Construction: Constructing buildings and roads churns up the ground and exposes soil to erosion. In some locations, native landscapes, such as forest and grassland, are cleared, exposing the surface to erosion (in some locations the land that will be built on is farmland). Near construction sites, dirt, picked up by the wind, is often in the air. Completed construction can also contribute to erosion (**Figure** below).

Urban areas and parking lots result in less water entering the ground. Water runs off the parking lot onto nearby lands and speeds up erosion in those areas.

Recreational Activities: Recreational activities may accelerate soil erosion. Off-road vehicles disturb the landscape and the area eventually develops bare spots where no plants can grow. In some delicate habitats, even hikers' boots can disturb the ground, so it's important to stay on the trail.

(a) ATV'S churn up the soil, accelerating erosion. (b) Hiking trails may become eroded.

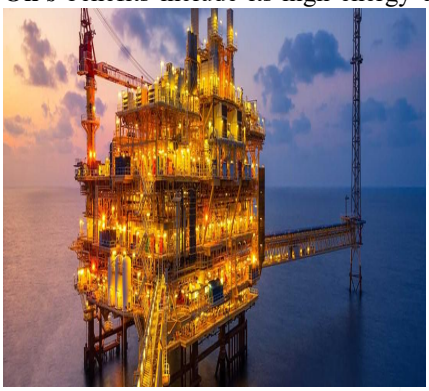
Soil erosion is as natural as any other type of erosion, but human activities have greatly accelerated soil erosion. In some locations soil erosion may occur about 10 times faster than its natural rate. Since Europeans settled in North America, about one-third of the topsoil in the area that is now the United States has eroded away

8. Oil as Natural Resource

We use **petroleum** products to propel vehicles, to heat buildings, and to produce electricity. In the industrial sector, the petrochemical industry **uses petroleum** as a raw material (a feedstock) to make products such as plastics, polyurethane, solvents, chemicals, as well as many lubricants, waxes, tars and asphalts.and hundreds of other intermediate and end-user goods.

Petroleum, also called crude **oil**, is a fossil fuel. Like coal and **natural** gas, **petroleum** was formed from the remains of ancient marine organisms, such as plants, algae, and bacteria

Oil's benefits include its high energy density and versatility. **Oil** is used to produce products like transport fuels and many



other common products. While all these products are important to global society, approximately 71% of global **oil** consumption is used to enable transportation systems.

Three technologies are **used** to convert **oil** into electricity: Conventional steam - **Oil** is burned to heat water to create steam to generate electricity. Combustion turbine - **Oil** is burned under pressure to produce hot exhaust gases which spin a turbine to generate electricity.

A 42-U.S. gallon **barrel** of crude **oil** yields about 45 gallons of petroleum products. ... While almost 40% of **barrel of oil is used** to produce gasoline, the rest is **used** to produce a host of products including jet fuel and plastics and many industrial chemicals.

Oil is particularly useful as a fuel because of its high **energy** density. As previously mentioned, the original **energy source** of **oil** is the Sun, as the **energy** stored within dead organic matter is what creates crude **oil** over time

Since average domestic crude oil weighs about 7.21 pounds per gallon, a barrel of oil weighs **around 300 pounds** or about 136 kilograms

The oil is burned to heat water and produce steam. This steam propels the blades of a turbine. This is attached to a generator, which produces electricity.

Oil reserves can be found all over the world, including the North Sea, Saudi Arabia, Russia, the United States, Iran, Iraq and China.

There is a wide variety of cooking oils from plant sources such as **olive oil**, **palm oil**, soybean oil, canola oil (rapeseed oil), corn oil, **peanut oil** and other vegetable oils, as well as animal-based oils like butter and lard.

Vegetable oil is a renewable **resource**. We create **vegetable oil** from vegetables, such as corn or soybeans. They are plants.

Advantages of using crude oil

- Oil can easily be transported by a network of pipelines.
- Oil-fired power stations can, in theory, be built almost anywhere.

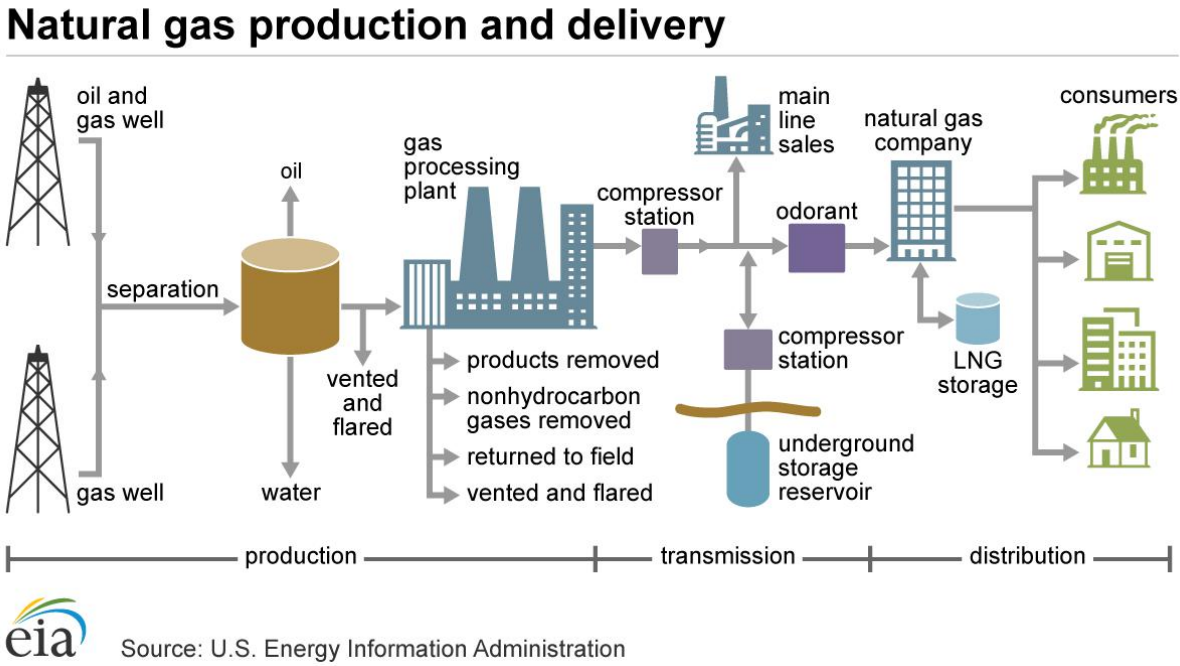
Disadvantages of using crude oil

- ❖ Oil is a non-renewable source of energy. This means that one day we will probably run out of crude oil.
- ❖ Burning oil produces carbon dioxide gas. This is a greenhouse gas that contributes towards climate change.
- ❖ Burning oil can pollute the air.
- ❖ Much of our oil has to be imported and it is becoming more and more expensive as reserves reduce and imports increase.
- ❖ Producing electricity from crude oil is expensive compared to other fossil fuels such as coal or gas.

9. Natural Gas as Natural Resource

Natural gas (also called fossil gas; sometimes just gas) is a mixture of **gases** which are rich in hydrocarbons. All these **gases** (methane, nitrogen, carbon dioxide etc) are naturally found in atmosphere. **Natural gas** reserves are deep inside the earth near other solid & liquid hydrocarbons beds like coal and crude oil.
Natural gas is made up of a mixture of four naturally occurring gases, all of which have different molecular structures. This mixture consists primarily of **methane**, which makes up 70-90% of natural gas along with ethane, butane and propane.

Natural Gas Liquids and Petrochemicals. Methane - One carbon atom; chemical **formula** CH4. The principal use of methane

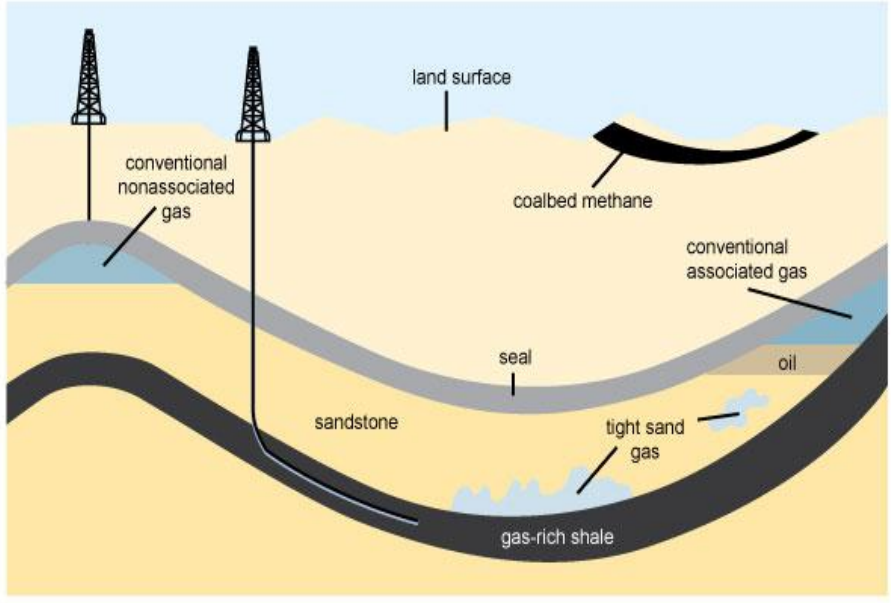


is as a fuel. The **natural gas** that is delivered to your home is almost pure methane. In its unprocessed state, natural gas is composed of varying quantities of **methane**, ethane, propane, butanes, and pentanes.
It is **formed** when layers of decomposing plant and animal matter are exposed to intense heat and pressure under the surface of the Earth over millions of years. The energy that the plants originally obtained from the sun is stored in the form of chemical bonds in the **gas**.

Some common examples are:

- ➢ Home heating through natural gas furnaces.
- ➢ Warming **water** in hot **water** heaters.
- ➢ Cooking food on barbecues and gas-burning stoves.
- ➢ Operating gas fired fireplaces.

In the United States, most natural gas is burned as a **fuel**. In 2012 about 30% of the **energy** consumed across the nation was obtained from natural gas. It was used to generate electricity, **heat** buildings, **fuel** vehicles, **heat water**, bake foods, power industrial furnaces, and even run air conditioners!



Source: Adapted from *United States Geological Survey factsheet 0113-01* (public domain)

Advantages of Natural Gas

1. Widely used, contributes 21% of the world's energy production today
2. Delivery infrastructure already exists
3. End use appliances already widespread
4. Used extensively for power generation as well as heat
5. Cleanest of all the fossil fuels
6. Burns quite efficiently
7. Emits 45% less CO2 than coal
8. Emits 30% less CO2 than oil
9. Abundant supply in the US. DOE estimates 1.8 trillion barrels
10. Low levels of criteria pollutants, (e.g. SOx, NOx) or soot when burned
11. Can be used as an automotive fuel
12. Burns cleaner than gasoline or diesel
13. No waste (e.g. ash) or residue to deal with
14. Lighter than air, safer than propane which is heavier than air
15. Can be used to makes plastics, chemicals, fertilizers and hydrogen
16. Natural gas industry employs 1.2 million people

Disadvantages of Natural Gas

1. Non-renewable fuel, supply cannot be replaced for millennia
2. Emits carbon dioxide when burned
3. Contains 80-95% methane, a potent greenhouse gas (GHG)
4. Explosive, potentially dangerous
5. Concentrated sources require long distance transmission and transportation
6. Energy penalties at every stage of production and distribution
7. Requires extensive pipelines to transport over land
8. Stored and distributed under high pressure
9. Requires turbine-generators to produce electricity
10. Liquefied form (LNG) used to transport over water, in tanker ships is potentially very dangerous
11. Energy use competes with use for chemicals and fertilizers
12. Additionally, there are significant environmental risks associated with "fracking"
13. Water pollution due to runoff of fracking chemicals
14. Companies are not required to disclose the composition of fracking chemicals (another example of lobbying in action).
15. Water can also bring up adsorbed underground toxins including arsenic
16. GHG footprint of shale gas greater than coal over 100 year time frame
17. Fracking has been linked to earthquakes
18. Casing leaks lead to gas in the water—blazing faucets
19. Fracking requires a large amount of water

10. Forests and Timber as Natural Resource

Forests are an extremely important **natural resource** that can potentially be sustainably harvested and managed to yield a diversity of commodities of economic importance. Wood is by far the most important product harvested from **forests**. The wood is commonly manufactured into paper, **lumber**, plywood, and other products.

Timber is not only a renewable and recyclable **resource**, but it is energy-efficient to produce. Importantly, **timber** acts as a carbon store, giving it an **important** role to play in reducing carbon emissions. When sustainably produced, **timber** offers multiple 'values' to New South Wales: environmental, social and economic.

Forests are a valuable **resource** providing food, shelter, wildlife habitat, fuel, and daily supplies such as medicinal ingredients and paper. **Forests** play an important role in balancing the Earth's CO_2 supply and exchange, acting as a key link between the atmosphere, geosphere, and hydrosphere

Trees are important because they provide valuable commodities, including **wood**, paper, and fruit. However, forests are not distributed equally around Earth, and there are economic and social implications of some regions having more **timber resources** than others

The importance of **forests** cannot be underestimated. We depend on **forests** for our survival, from **the** air we breathe to **the** wood we use. Besides providing habitats for animals and livelihoods for humans, **forests** also offer watershed protection, prevent soil erosion and mitigate climate change

Uses of Forests

1. Fuelwood. For the rural population, **wood** is an important source of energy for cooking and heating
2. Fodder. Fodder from the forest forms an important source for cattle and other grazing animals in the hilly and the arid regions and during a drought
3. Wind breaks and shelter belts. ...
4. Soil erosion check
5. Soil improvement.

Steps to protect our Forests

1. Protect More Ancient Forests
2. Use Ecoforestry in All Secondary Forests
3. Support Canada's National Forest Strategy
4. Ban the Import of Illegally Logged Timber
5. Use Less Paper and Wood
6. Invest in Rainforest Communities
7. Act on the Solutions to Global Climate Change
8. Act on the Solutions to Global Poverty

All the area in red is **commercial forest** and area outside of that is **non-commercial forests**. **Commercial forest** is a part of a **forest** that has large enough trees and is close enough to a market to allow it to be harvested by the **forest** industry.

In the context of timber and man-made boards, the original source is a tree. Trees are grown all over the world - some are for timber produce, and others could be for paper. They can be categorised as **hardwood** and softwood. **Hardwood** is harvested from deciduous trees.

These **three types** are: softwoods, hardwoods, and engineered wood. Each of these **different** wood **types** can be used in a number of **different** ways

The uses of **wood** in furniture, buildings, bridges, and as a source of energy are widely known. ... Additionally, **wood** from trees and bushes, can be turned into a variety of production, such as **wood** pulp, cellulose in paper, celluloid in early photographic film, cellophane, and rayon (a substitute for silk)

Trees are vital. As the biggest plants on the planet, they give **us** oxygen, store carbon, stabilise the soil and give life to the world's wildlife. They also provide **us** with the materials for tools and shelter.

The Amazon Rainforest is the largest forest in the world. On top of being recognized for its size, **the Amazon** is also acknowledged as being one of the single most important forests in Earth's global climate.

11. Grasslands and Plants as Natural Resources

Despite lower rates of annual rainfall than prairies, many **plants** grow in steppes, including buffalo grass, cacti, sagebrush, blue grama, speargrass and sunflower-like **flowers**. Snakes, pronghorn, sage-grouse, pygmy rabbits.

Resources in the temperate grasslands include wheat, **coal**, oil, corn, livestock, gas, and oats. **Water** and **timber** are two primary resources that one can find in the chaparral.

Heteropogon and Sorghum dominate **grasslands** in moister, northern areas, and Astrebla (Mitchell grass) is prevalent in seasonally arid areas, especially on cracking clay soils in the east. Other grass **species** are usually subordinate but may dominate in spots.

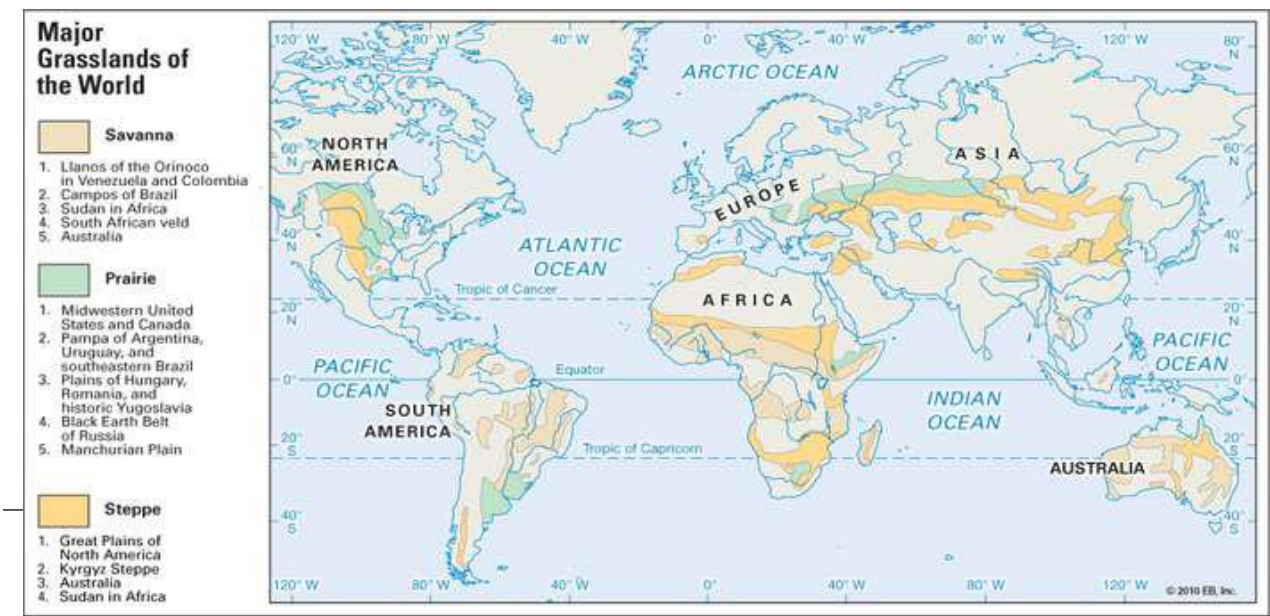
Grasslands support a variety of species. Vegetation on the African savannas, for example, feeds animals including zebras, wildebeest, gazelles, and giraffes. On temperate grasslands, you might find **prairie dogs**, badgers, coyotes, swift foxes, and a variety of birds.
Some of the **world's** largest expanses of **grassland** are found in the African savanna, and these are maintained by wild herbivores as well as by nomadic pastoralists and their cattle, sheep or goats.

Temperate **grasslands are** characterized as having grasses as the dominant vegetation. Trees and large shrubs **are** absent. ... It is **nutrient-rich** from the growth and decay of deep, many-branched grass roots. The rotted roots hold the **soil** together and provide a food source for living plants.

Humans plow **grasslands** to plant wheat and other crops, replace wildlife with domestic livestock, and kill predator and prey alike. Few **grasslands** are protected from development.

They are the key life source to sustainability, and are essential in sustaining soil health. Having a wealth of grasslands provides our ecosystem with sufficient clean water, helps prevent floods, and promotes the natural production of food crops and meats.

These **grasslands** are managed for a variety of **purposes** including forage, fish and wildlife, timber, water, and recreation resources. While National **Grasslands** are valued for these **basic** goods, they also deliver other **important** services that are



often perceived to be free and limitless.

The following are the key characteristics of the grassland biome:

- Vegetation structure that is dominated by grasses.
- Semi-arid climate.
- Rainfall and soils insufficient to support significant tree growth.
- Most common at mid-latitudes and near the interiors of continents.
- **Grasslands** are often exploited for agricultural use.

There are two main kinds of grasslands: tropical and temperate. Examples of **temperate grasslands** include Eurasian **steppes**, **North American prairies**, and Argentine **pampas**. Tropical grasslands include the hot **savannas** of sub-Saharan Africa and northern Australia.

12. Crops and Cultivation as Natural Resource

Terrestrial vegetation is one of earth's most vital **natural resources**. **Crops** provide food, fiber, and fuel that sustain human life, while native vegetation preserves biodiversity, builds and protects soil, and plays a key role in the water cycle.

U.S. agricultural production relies heavily on the Nation's land, **water**, and other natural resources, and has a direct impact on the quality of the Nation's natural environment.

Agriculture is called natural resources because **agriculture**, requires fertile soil, with nutrients. Soil is a **natural resource** that provides, minerals and water to plants.

For agriculture production, these include **soil** formation, erosion control and fertility, nutrient cycling, **water** provision and purification, pollination, pest control, carbon sequestration, resilience to natural disasters (drought etc).

Natural resources, especially those of **soil**, **water**, plant and animal diversity, **vegetation cover**, renewable energy sources, climate, and ecosystem services are fundamental for the structure and function of agricultural systems and for social and environmental sustainability, in support of life on earth.

13. Rivers & Oceans as Natural Resources

In the beginning, the primeval seas were probably only slightly salty. But over time, as rain fell to the Earth and ran over the land, breaking up rocks and transporting their minerals to the ocean, the ocean has become saltier. Rain replenishes freshwater in rivers and streams, so they don't taste salty. However, the water in the ocean collects *all* of the salt and minerals from *all* of the rivers that flow into it.It is estimated that the rivers and streams flowing from the United States alone discharge 225 million tons of dissolved solids and 513 million tons of suspended sediment annually to the ocean. Throughout the world, rivers carry an estimated four billion tons of dissolved salts to the ocean annually. About the same tonnage of salt from ocean water probably is deposited as sediment on the ocean bottom and thus, yearly gains may offset yearly losses. In other words, the ocean today probably has a balanced salt input and output (and so the ocean is no longer getting saltier).

It provides a treasured source of recreation for humans. It is mined for minerals (salt, sand, gravel, and some manganese, copper, nickel, iron, and cobalt can be found in the deep sea) and drilled for crude oil. The **ocean** plays a critical role in removing carbon from the atmosphere and providing oxygen

For instance the Nile discharges into Mediterranean Sea; the Amazon into Atlantic Ocean; the Yangtze River into East China Sea; the Mississippi-Missouri into Gulf of Mexico; the Yenisei into Arctic Ocean; the Yellow River empties into Bohai Sea; Ob–Irtysh into Gulf of Ob; Congo River into Atlantic Ocean; the Yukon source is in British Columbia, Canada, from which it flows through the Canadian Yukon Territory (itself named after the river). The lower half of the river lies in the U.S. state of Alaska. The river is 3,190 kilometres (1,980 mi)[2][3] long and empties into the Bering Sea at the Yukon–Kuskokwim Delta. The average flow is 6,430 m^3/s (227,000 ft^3/s).[1] The total drainage area is 832,700 km^2 (321,500 mi^2),[1] of which 323,800 km^2 (126,300 mi^2) is in Canada. The total area is more than 25% larger than Texas or Alberta.

The deep sea contains many different resources available for extraction, including silver, gold, **copper**, **manganese**, **cobalt**, and **zinc**. These raw materials are found in various forms on the sea floor.

The **ocean** produces over half of the world's oxygen and absorbs 50 times more carbon dioxide than our atmosphere. Climate regulation: Covering 70 percent of the Earth's surface, the **ocean** transports heat from the equator to the poles, regulating our climate and weather patterns

There is only one global **ocean**. Historically, **there** are four named **ocean** basins: the Atlantic, Pacific, Indian, and Arctic. However, most countries - including the United States - now recognize the Southern (Antarctic) as the fifth **ocean** basin. The Pacific, Atlantic, and Indian are the most commonly known.

A **river** forms from water moving from a higher elevation **to** a lower elevation, all due **to** gravity. When rain falls on the land, it either seeps **into** the ground or becomes runoff, which **flows** downhill **into rivers** and lakes, on its journey towards the seas. ... **Rivers** eventually end up **flowing into** the **oceans**.

The place where a **river** begins is called its **source**. **River** sources are also called headwaters. **Rivers** often get their water from many tributaries, or smaller streams, that join together. The tributary that started the farthest distance from the **river's** end would be considered the **source**, or headwaters.

Humans use **rivers** for irrigation in agriculture, for drinking water, for transportation, to produce electricity through hydroelectric dams, and for leisure activities like swimming and boating. Each of these uses can affect the health of a **river** and its surrounding ecosystems

Seven Seas and Five Oceans include the

- the Pacific Ocean.
- he Atlantic Ocean.
- the Indian Ocean.
- the Arctic Ocean.
- the Mediterranean Sea.
- the Caribbean Sea.
- the Gulf of Mexico.

Sea water Cannot purified, because the problem is that the desalination of **water** requires a lot of energy. **Salt** dissolves very easily in **water**, forming strong chemical bonds, and those bonds are difficult to break. Energy and the technology to desalinate **water** are both expensive, and this means that desalinating **water** can be pretty costly

Topographical classification of Rivers

- Youthful **river**: A **river** with a steep gradient that has very few tributaries and flows quickly. ...
- Mature **river**: A **river** with a gradient that is less steep than those of youthful **rivers** and flows more slowly. ...
- Old **river**: A **river** with a low gradient and low erosive energy.

Parts of a River

- **River** bed: The bottom surface of the **river**, which the water flows on top.
- Source: Where the **river** starts from, usually a lake, glacier, snowfield or spring.
- Banks: The edge or sides of the **river** that the water flows within. ...
- Course: The path of the **river**.

14. Sun as Natural Resource

The **sun** is a **natural**, renewable **resource**. It generates light through the process of nuclear fusion, and it will continue doing so for billions of years

The **sun** is really important because it provides us with a lot of **resources** such as light ,heat ,energy , vitamin D ,helps grow our food

The **sun** provides **energy** through light radiation. This helps plants by providing them with the **energy** to convert carbon dioxide into sugars, which is how they grow. The **sun** helps humans in a variety of ways, but most importantly by fueling plant growth, so we can eat the plants and the other animals that eat the plants.

Sunlight is a **renewable resource**, and its most direct use is achieved by capturing the sun's **energy**. A variety of **solar energy** technologies are used to convert the sun's **energy** and light into heat: illumination, hot water, electricity and (paradoxically) cooling systems for businesses and industry.

The sun's UV rays help your body make this nutrient, which is important for your **bones**, blood cells, and immune system. It also helps you take in and use certain minerals, like calcium and phosphorus.

Seeing the natural light of the **sun** helps the brain work **better**. No, not staring into the **sun**, but allowing the **eyes** to be exposed to natural outdoor light—contact lenses, eyeglasses, sunglasses and windows block the helpful **sun** rays.

Sunlight has also been known to kill bacteria and **heal** skin wounds. **Sunlight** helps build up your immune system. White blood cells increase with **sun** exposure. These cells and these play a major role in defending the body against infections.

Proper exposure to the **sunlight** can increase the level of vitamin D in the body. Vitamin D has a major role when it comes to **hair** growth. ... Epithelial cells are greatly responsible for helping your **hair** to grow. You also need to remember that **hair** is sensitive to the harmful UV rays.

Sunlight triggers **the** synthesis of vitamin D within **the** body. Stanford researchers found that this action causes immune cells

to travel to **the** outer layers of **the skin** where they are available to protect and help repair damage such as that caused by **sun** exposure.

15. Climate & Weather as Natural Resource

Weather is the condition of the atmosphere over a short period of time; **Climate** is the average course of weather conditions for a particular location over a period of many years

Climate means prevailing weather conditions of a region, as temperature, air pressure, humidity, precipitation, sunshine, cloudiness, and winds, throughout the year, averaged over a series of years. a region or area

Ocean currents act much like a conveyor belt, transporting warm water and precipitation from the equator toward the poles and cold water from the poles back to the tropics. Thus, ocean currents **regulate** global **climate**, helping to counteract the uneven distribution of solar radiation reaching Earth's surface.

Water vapor and clouds are the major contributors to **Earth's** greenhouse effect, but a new atmosphere-ocean **climate** modeling study shows that the planet's temperature ultimately depends on the atmospheric level of carbon dioxide.

Layers of atmosphere include **troposphere**, **stratosphere**, **mesosphere** and **thermosphere**. Earth's atmosphere has a series of layers, each with its own specific traits. Moving upward from ground level, these layers are named the **troposphere**, **stratosphere**, **mesosphere**, **thermosphere** and **exosphere**.

The **oceans** influence **climate** by absorbing solar radiation and releasing heat needed to drive the atmospheric circulation, by releasing aerosols that influence cloud cover, by emitting most of the water that falls on land as rain, by absorbing carbon dioxide from the atmosphere and storing it for years

We realize **climate** is an essential **resource,** almost like the basket that everything else sits in. If the basket falls apart, the other **resources** don't matter. But we are also discovering **climate** as a **resource**.

In the future, its effects may be felt through: ... warming streams and lakes that reduce cold water fish habitats, resulting in a

decline in certain fish species and recreational fishing opportunities

Climate change describes a **change** in the average conditions — such as temperature and rainfall — in a region over a long period of time. For **example**, 20,000 years ago, much of the United States was covered in glaciers. In the United States today, we have a warmer **climate** and fewer glaciers

Resources causing global warming include the burning of **fossil fuels** like coal, oil, and gas for electricity, heat, and transportation is the primary source of human-generated emissions. A second major source is deforestation, which releases sequestered **carbon** into the air.

The climate of any particular place is influenced by a host of interacting factors. These include **latitude**, **elevation**, nearby water, **ocean currents**, **topography**, vegetation, and prevailing winds. The global climate system and any changes that occur within it also influence local climate.

Climate is the average of that weather. For **example**, you can expect snow in the Northeast in January or for it to be hot and humid in the Southeast in July. This is **climate**. The **climate** record also includes extreme values such as record high temperatures or record amounts of rainfall.

Five main climate types on Earth:

1. Tropical.
2. Dry.
3. Temperate.
4. Continental.
5. Polar.

Solutions to Reverse Climate Change

1. Refrigerant Management.
2. Wind Turbines (Onshore)
3. Reduced Food Waste
4. Adoption of a Plant-Rich Diet
5. Tropical Forest Restoration
6. Educating Girls
7. Family Planning
8. Solar Farms.

Six factors that affect climate.

- ✓ **Latitude**. It depends on how close or how far it is to the equator
- ✓ **Ocean currents**. Certain **ocean currents** have different temperatures
- ✓ **Wind** and air masses. Heated ground causes air to rise which results in lower air pressure
- ✓ **Elevation**
- ✓ Relief
- ✓ Nearness to **water**

Factors that can cause the Earth's climate to get hotter or colder:

- ☞ Strength of the sun
- ☞ Changes in the Earth's orbit.
- ☞ Changes in the orientation of the Earth's axis of rotation
- ☞ Quantity of **greenhouse gases** in the atmosphere
- ☞ **Carbon dioxide content** of the oceans

16. Wind Energy as Natural Resource

Energy derived from **wind** may also be converted to hydrogen and used as a form of fuel for transportation or stored for subsequent power **generation**. Using **wind energy** reduces the environmental impact of generating electricity because it requires no fuel and does not produce pollution or greenhouse gases.

Mountains, bodies of water, and vegetation all influence wind flow patterns,. Wind turbines convert the energy in wind to **electricity** by rotating propeller-like blades around a rotor. The rotor turns the drive shaft, which turns an electric generator.

Facts about wind energy include

1. Windmills have been in use since 2000 B.C.
2. The first modern wind turbine was built in the 1940's in Vermont, USA
3. The largest wind turbine in the world is in Hawaii, USA
4. Wind energy is mostly harnessed by wind turbines
5. The average onshore wind turbine can power more than 1,500 average EU households
6. Wind power is unique for the fact that it does not use any water
7. The largest turbines can harness energy to power 600 UK homes
8. A small turbine in the back yard can easily power a small business or a home
9. Smaller wind turbines can be used to charge batteries or as backup power
10. The wind energy industry is growing exponentially
11. The most installed capacity of wind energy is in Germany, followed by Spain
12. Wind energy is the fastest growing mode of electricity production across the planet
13. Albert Betz (1885-1968) was a German physicist and the pioneer of wind turbine technology

Wind turbines convert the kinetic energy in the wind into mechanical power. This mechanical power can be used for specific tasks (such as grinding grain or pumping **water**), or can be converted into electricity by a generator.

Advantages of Wind Power

1. Wind **power** is **cost**-effective
2. Wind creates jobs
3. Wind enables U.S. industry growth and U.S. competitiveness
4. It's a clean fuel source
5. Wind is a domestic source of energy
6. It's sustainable
7. Wind turbines can be built on existing farms or ranches
8. Clean & Environment friendly Fuel source:– It doesn't pollute air like power plant relying on combustion of fossil fuel. ...
9. **Renewable** & Sustainable:– Winds are caused by heating of atmosphere by the sun, earth surface irregularities and the rotation of the earth. ...
10. **Cost** Effective:– Wind energy is completely free.

Two disadvantages of wind energy include include initial cost and technology immaturity. Firstly, constructing **turbines** and **wind** facilities is extremely expensive. Offshore **wind energy** produces more **energy** than onshore **wind energy**, but costs much more to establish

17. Fossil Fuels as Natural Resources

Fossil fuels are hydrocarbons, primarily coal, **fuel** oil or **natural** gas, formed from the remains of dead plants and animals. In common dialogue, the term **fossil fuel** also includes hydrocarbon-containing **natural resources** that are not derived from animal or plant sources.

Coal, **crude oil**, and **natural gas** are all considered fossil fuels because they were formed from the fossilized, buried remains of **plants** and animals that lived millions of years ago. Because of their origins, fossil fuels have a high carbon content. The four types of fossil fuels are **petroleum**, **coal**, **natural gas** and **Orimulsion** (capitalized because it is a proprietary, or trade, name). They have a number of important physical, chemical and other properties in common, but perhaps the most critical fact about fossil fuels is that they are not renewable.

The United States gets 81% of its total energy from oil, coal, and natural gas, all of which are **fossil fuels**. We depend on those **fuels** to heat our homes, run our vehicles, power industry and manufacturing, and provide us with electricity. **Fossil fuels** have been an incredibly successful **source** of cheap, instant **energy**.**Fossil fuels** get their name because they are literally made from **fossils** — dead organisms (mostly plants) that didn't decay because they were squashed under water or mud with no oxygen

Burning fossil fuels like coal, oil, and gas results in carbon pollution, which causes climate change. So if **we want to stop** climate change (and avoid devastating extreme weather, sea level rise wiping out communities, global conflict and instability, etc.), **we** have to **stop burning fossil fuels**

Advantages of Fossil Fuels include they are Well Developed, Cheap and Reliable. Disadvantages of Fossil Fuels include, they Contribute to Global Warming, Non-Renewable, Unsustainable, Incentivized

18. Animals as Natural Resource

For **humans**, animals are a productive resource. First of all, they supply a wide variety of foods that man needs to survive: milk, cheese, eggs, butter, salami and cold **meat**, etc. Some animal **species**, such as **corals** and **oysters**, are used by man to produce jewels and handicrafts.

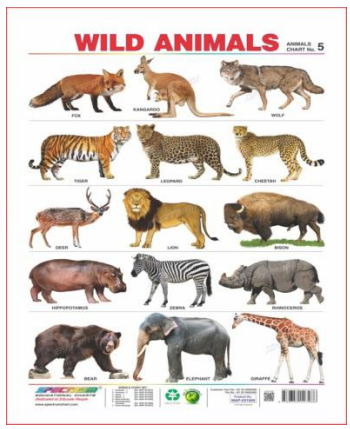
Animals need **food**, **water**, **shelter**, and space to survive. Herbivores can live only where plant **food** is available. Carnivores can live only where they can catch their **food**.

Any **natural** substance that humans use can be considered a **natural resource. Animals**, birds, fish and plants are **natural resources** as well. **Natural resources** are used to make food, fuel and raw materials for the production of goods. All of the food that people eat comes from plants or **animals**.

Animals are important because humans rely on **animals** for food, fiber, labor and companionship. **Animal** scientists help put food on our tables. **Animal** scientists work with farmers to improve **animal** breeding, diseases and nutrition. When **animals** grow well and stay healthy, farmers can produce more meat, milk or eggs for our consumption.

Human uses of animals include both practical uses, such as the **production** of food and clothing, and symbolic uses, such as in art, literature, mythology, and religion. All of these are elements of culture, broadly understood. Animals used in these ways include **fish**, crustaceans, insects, molluscs, mammals and birds.

Interacting with **animals** has been shown to decrease levels of cortisol (a stress-related hormone) and lower blood pressure. Other studies have found that **animals** can reduce loneliness, increase feelings of social support, and boost your mood.



Some of the health benefits of having a pet include:

- Decreased **blood pressure**.
- Decreased **cholesterol** levels.
- Decreased triglyceride levels.
- Decreased feelings of loneliness.
- Increased opportunities for **exercise** and outdoor activities.
- Increased opportunities for socialization.

The Five Welfare Needs: a simple framework for your pet's health and well-being

1. The need for a suitable environment. ...
2. The need for suitable **diet**. ...
3. The need to exhibit normal behavioural patterns. ...
4. The need to be housed with or apart from other animals. ...

5. The need to be protected from pain, suffering and disease.

Wildlife traditionally refers to undomesticated **animal** species, but has come to include all organisms that grow or live wild in an area without being introduced by humans. Wildlife can be found in all ecosystems. This includes such **animals** as domesticated cats, dogs, mice, and gerbils.



Animals help us to save our **environment**. Some micro organisms such as bacteria help us clean the **environment**; others help plants by converting free nitrogen from air and feeding the roots. Some insects and earthworms help in agriculture by increasing fertility of the soil and also by increasing organic quality of soil.

Hunting wildlife or feral **animals** is most commonly done by humans for meat, recreation, to remove predators that can be dangerous to humans or domestic **animals**, to remove pests that destroy crops or **kill** livestock, or for trade.

19. Coal as Natural Resource

Coal is primarily used as fuel to generate electric power in the United States. The **coal** is burned and the heat given off is used to convert water into steam, which drives a turbine

Coal is considered a natural resource simply because it's derived from the natural environment. Most coal is believed to be derived from decayed plant material preserved from the Carboniferous period over 300 million years ago. All fossil fuels are considered natural resources (gas, oil, coal) because they come from these natural remains of ancient life.

Coal is an abundant natural resource that can be used as a source of energy, as a chemical source from which numerous synthetic compounds (e.g., dyes, oils, waxes, pharmaceuticals, and pesticides) can be derived, and in the production of coke for metallurgical processes. Coal is a major source of energy in the production of electrical


power using steam generation. In addition, gasification and liquefaction of coal produce gaseous and liquid fuels that can be easily transported (e.g., by pipeline) and conveniently stored in tanks. After the tremendous rise in coal use in the early 2000s, which was primarily driven by the growth of China's economy, coal use worldwide peaked in 2012. Since then coal use has experienced a steady decline, offset largely by increases in natural gas use.

20. Petroleum as Natural Resource

Petroleum, also called crude oil, is a fossil fuel. Coal, **natural** gas, and **petroleum** are all fossil fuels that formed under similar conditions. Today, **petroleum** is found in vast underground reservoirs where ancient seas were located. **Petroleum** reservoirs can be found beneath land or the ocean floor.

Since **petroleum** is not only a nonrenewable **resource**, but a very versatile material that is used both as fuel that can be converted to gasoline, can be used as heat sources, can deliver energy to generate electricity, can generate energy, and is also used to produce useful every day products, it is a **valuable resource**.

These petroleum products include **gasoline**, distillates such as **diesel fuel** and heating **oil**, jet fuel, petrochemical feedstocks, waxes, lubricating oils, and asphalt. **Petroleum** products include transportation fuels, fuel oils for heating and electricity generation, asphalt and road oil, and feedstocks for making the chemicals, plastics, and synthetic materials that are in nearly everything we **use**.

Extracting crude oil normally starts with drilling wells into an underground reservoir. When an oil well has been tapped, a geologist (known on the rig as the "mudlogger") will note its presence. Often many wells (called multilateral wells) are drilled into the same reservoir, to an economically viable **extraction** rate.

Russia is the largest country in the world by landmass and over 106 billion barrels of proven oil reserves fall within the country's borders. Along with the U.S. and Saudi Arabia, Russia is one of only three countries in the world producing **more** than 10 million barrels of oil per day.

Crude oil is a mixture of hydrocarbons that exists as a liquid in underground geologic formations and remains a liquid when brought to the surface. **Petroleum** is a broad category that includes both **crude oil** and **petroleum** products. The terms **oil** and **petroleum** are sometimes used interchangeably.

21. Hydrogen as Natural Resource

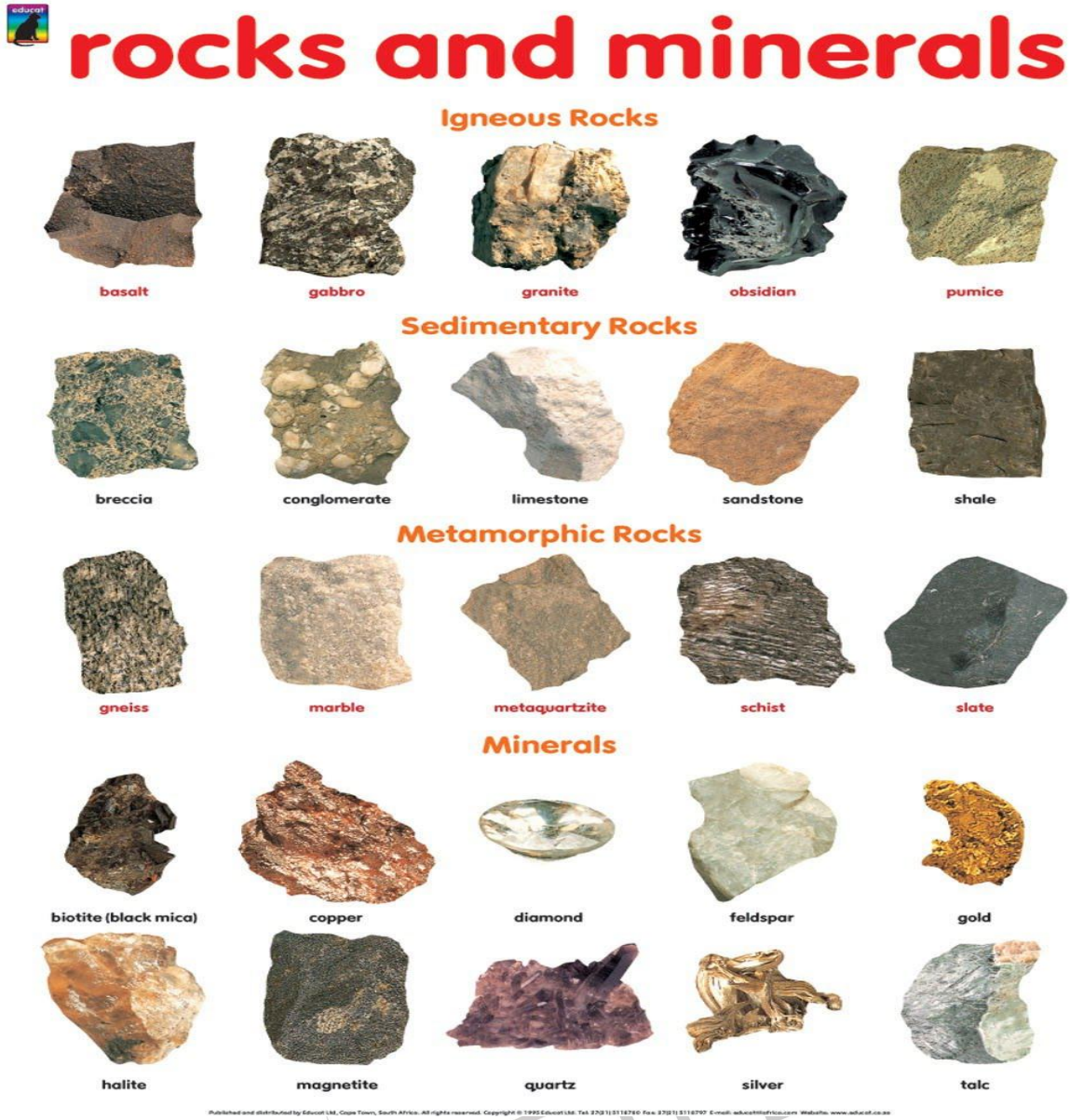
Hydrogen can be produced from diverse, domestic **resources**. Currently, most **hydrogen** is produced from fossil fuels, specifically **natural** gas. Electricity—from the grid or from renewable sources such as wind, solar, geothermal, or biomass—is also currently used to produce **hydrogen**.

Hydrogen can be **used** in fuel cells to generate electricity, or power and heat. Today, **hydrogen** is most commonly **used** in petroleum refining and fertilizer production, while transportation and utilities are emerging markets. The two most common methods for producing hydrogen are **steam**-methane reforming and electrolysis (**water** splitting). As of 2020, the majority of **hydrogen** (~ 95%) is **produced** from fossil fuels by steam reforming of **natural** gas, partial oxidation of methane, and coal gasification. Other methods of **hydrogen** production include biomass gasification and electrolysis of water.

22. Minerals as Natural Gas

Minerals are non–renewable **natural resources** that are vital for the construction, manufacturing and energy industries. The aim of sustainable **mineral** development is to ensure **mineral** use is kept to a minimum amount without having a negative impact on economic growth. A '**Mineral Resource**' is a concentration or occurrence of material of intrinsic economic interest in or on the earth's crust in such form, quality and quantity that there are reasonable prospects for eventual economic extraction.

Minerals are **made up** of chemical elements. A chemical element is a substance that is **made up** of only one kind of atom.



Oxygen, hydrogen, iron, aluminium, gold and copper are chemical elements.

Economic **minerals** include: energy **minerals**, metals, construction **minerals** and industrial **minerals**. Energy **minerals** are **used** to produce electricity, fuel for transportation, heating for homes and offices and in the manufacture of plastics. Energy **minerals** include coal, oil, **natural** gas and uranium.

Five products derived from mineral resources

- Carpet Calcium carbonate, limestone.
- Glass/Ceramics Silica sand, limestone, talc, lithium, borates, soda ash, feldspar.
- Linoleum Calcium carbonate, clay, wollastonite.
- Glossy paper Kaolin clay, limestone, sodium sulfate, lime, soda ash, titanium dioxide.
- Cake/Bread Gypsum, phosphates.

Mineral resources can be divided into two major categories - Metallic and Nonmetallic. Metallic resources are things like **Gold**, Silver, **Tin**, Copper, **Lead**, Zinc, Iron, Nickel, Chromium, and Aluminum. Nonmetallic resources are things like sand, gravel, **gypsum**, halite, **Uranium**, dimension stone

There are **two kinds of minerals**: macrominerals and trace **minerals**. You need larger amounts of macrominerals. They include calcium, phosphorus, magnesium, sodium, potassium, chloride and sulfur. You only need small amounts of trace **minerals**.

Mineral resources are amongst the most **important** natural **resources** that dictate the Industrial and economic development of a country because they provide raw materials to the primary, secondary and tertiary sectors of the economy.

List of minerals include

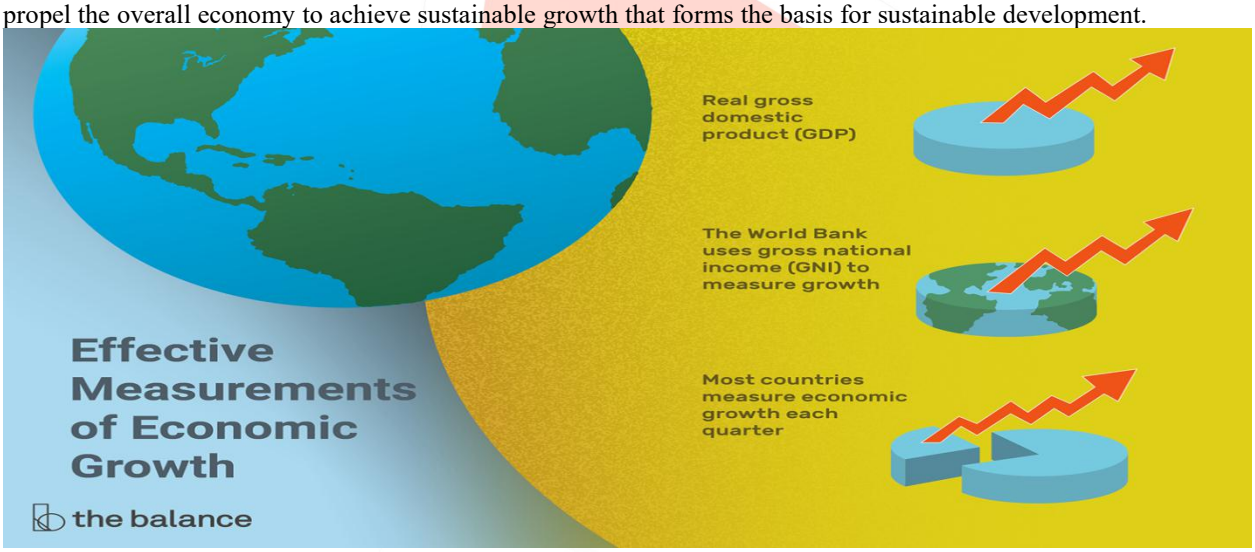
a. Iron
b. Copper
c. Silver
d. Steel

e. Aluminium
f. Phosphorus
g. Bauxite
h. Helium
i. Gold
j. Uranium
k. Other Minerals

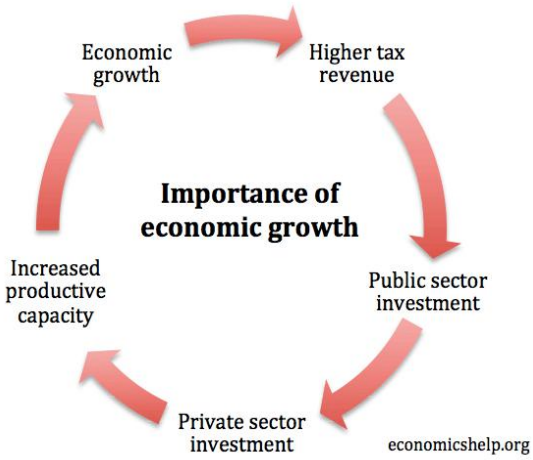
23. Economic Growth

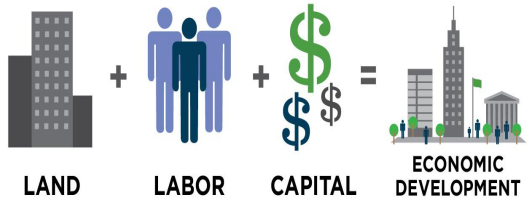
Natural resource utilization, pollution, and other environmental considerations have become critical to the possibilities of long-run economic growth and by extension sustainable development. The effect of natural resources on society is as old as human activities as the environment inserts itself between nature and society. Economic activities (production, exchange, and consumption) generate environmental problems while the depletion of scarce renewable and nonrenewable natural resources raise concerns about the sustainability of economic rents from the exploitation of natural resources. Sustainable development, a steady state long-term economic and social well-being, hinges on economic growth "a long term rise in capacity to supply increasingly diverse economic goods to its population; this growing capacity is based on advancing technology and the institutional and ideological adjustments that it demands"

Natural resources have a double-edge effect on economic growth, in that the intensity of its use raises output, but increases its depletion rate. Natural resource is a key input in the production process that stimulates economic growth. However, the depleting character of natural resources coupled with diminishing returns of factor input implies that dependence on natural resource utilization is not an optimal strategy for sustainable growth. By extension, intensive utilization of natural resources undermines sustainable development. Natural resources have limited direct economic use in satisfying human needs but transforming them into goods and services enhances their economic value to the society. Through the mix of productive activities by different sectors of the economy, transformation of natural resources into usable goods and services occurs to propel the overall economy to achieve sustainable growth that forms the basis for sustainable development.



The productivity of factors of production has positive relationship with absorptive capacity. Technological inter-connections among various sectors of the economy could evolve from structural and spatial interdependence of the production processes of the sectors. The rational response to incentives leads to increase in the level of activities of sectors of the economy in a self-reinforcing manner. The expansion of activities in the various sectors of the economy is mutually self-stimulating to provide opportunities for economies of scale that translate into lower per unit cost of production.





The manufacturing sector, with a sound service sector for support, is a vital source for economic growth through learning-by-doing, as such should have a pivotal link with natural resource sector to stimulate real productive activities that propels the economy toward sustainable growth and development. Ideas that emanate from production processes is the driving force for generating high levels of growth to form the bedrock for sustainable development.

As the essence of sustainability is to maintain a given level of social welfare at a constant leve, six key conditions are prerequisites. These are nondeclining consumption (utility), maintaining (constant) production opportunities over time, nondeclining natural capital stock, maintaining a steady yield of resource services, stability and resilience of the ecosystem through time, and the development of capacity for consensus building. These sustainability conditions require efficient management of resources as well as ethical and moral standards, which makes the crucial role of government in coordinating economic, social, and political activities imperative for achieving sustainable development.

Economic activities thrive with the existence of basic infrastructures and the rule of law that guarantees property rights (patents and copyright laws). In addition, human capital formation, which is the bedrock upon which all aspects of economic growth processes are hinged, requires to be nurtured by services that are provided by nonprofit making principles. Furthermore, natural resource sectors, around which many economic activities revolve, require legal and institutional framework based on robust institutional principles.

These essential services (provision of infrastructure, the rule of law, and human capital formation) are nonexcludable public goods; and therefore, not the function of economic agents that aim to maximize profit. It is imperative for government to undertake the crucial function of providing essential services as well as coordinating the activities of economic agents to ensure alignment with strategies for achieving sustainable development. A responsible government will ensure the formulation and implementation of policies for equity inter-generational balance in economic and social welfare for the benefit of both current and future generations, a sine qua non, for sustainable development. In conclusion therefore, even though economics is the fountain of human activities, effective governance, through the proper functioning of institutions and the implementation of robust policies, is crucial for achieving sustainable development.

24. The Economic Significance of Natural Resources

In recent years economists have recognized that, along with physical and human capital, environmental resources should be viewed as important economic assets, which can be called natural capital. However, the services provided by natural capital are unique. One of the biggest factors in the economic development of a country is the presence of favorable natural resources. In fact, most developed countries make the best use of the natural resources available to them. Any country starting its journey of economic development has to begin with and concentrate on the development of locally available natural resources.These resources help in increasing the levels of living and purchasing power. Further, an increased purchasing power helps obtain foreign exchange which is then used to purchase capital equipment. This sets the development process in motion.

25. Contribution towards fiscal revenue, income and poverty reduction

Natural Resources Revenue Management is responsible for collecting, accounting, analyzing, auditing, and disbursing revenues from energy and mineral leases and other monies owed for the utilization of public resources. Sustainable development has been defined variously as (a) living on nature's income instead of depleting its capital, (b) meeting the needs

of today's population without compromising the ability of future generations to meet theirs, and (c) managing natural, human, and financial assets to increase human health and well-being over the long term. Stabilize incomes in the local communities and avert further deterioration of **natural resources** (soil, water, forest, fishery, and biodiversity) we can reduce poverty.

26. Employment and job creation potential

Resource efficiency and improved environmental performance lead to innovation and job creation. The jobs created are due to policy interventions in resource efficiency and environment. Over the last decade several studies have investigated the link between the environment, resource efficiency and jobs. For example: 'Analysis of the Eco-industries, their employment and export potential' by Ecotec, 'Links between the environment, economy and jobs'. A main reason for companies to further invest in environmental technologies and resource efficiency is the creation of a comparative advantage. Efficient use of resources keeps costs down, and allows us to preserve its competitiveness. From a global perspective resource efficiency has gained strategic importance.

27. Natural resource management

Natural Resource Management (NRM) 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. NRM activities that specifically require the participation of local communities for their sustainable management. Examples of these kinds of projects include: micro-watershed management, irrigation water management, soil and water conservation, community forestry, community-based coastal zone fisheries management, and conservation of biodiversity.

28. Golbal Environment

Global Environment investments are predicated on the delivery of global environmental benefits in biodiversity, climate change mitigation, international waters, land degradation and forests, and chemicals and waste. Increasingly, GEF is seeking to deliver multiple environmental benefits through integrated investments across the various dimensions of the global environment.

Biodiversity: Global environmental benefits resulting from GEF's biodiversity financing include:

1. Conservation of globally significant biodiversity;
2. Sustainable use of the components of globally significant biodiversity; and
3. Fair and equitable sharing of the benefits arising from the utilization of genetic resources, including by appropriate access to genetic resources.

Climate Change Mitigation: Global environmental benefit in the Climate Change Mitigation focal area is the sustainable mitigation of the concentration of anthropogenic greenhouse gases (GHG) in the atmosphere. Specifically, it includes:

1. Mitigated GHG emissions;
2. Increased use of renewable energy and decreased use of fossil energy resources;
3. Improved energy efficiency;
4. Increased adoption of innovative technologies and management practices for GHG emission reduction and carbon sequestration; and
5. Conservation and enhanced carbon stocks in agriculture, forest, and other land use.

Land Degradation: Global environmental benefits resulting from GEF's focus on land degradation focal area, specifically addressing desertification and deforestation, include:

1. Improved provision of agro-ecosystem and forest ecosystem goods and services;
2. Mitigated/avoided greenhouse gas emissions and increased carbon sequestration in production landscapes;
3. Conservation and sustainable use of biodiversity in productive landscapes; and
4. Reduced pollution and siltation of international waters.

International Waters: Global environmental benefits targeted by GEF's work in international waters relate to transboundary concerns, including:

1. Multi-state cooperation to reduce threats to international waters;
2. Reduced pollution load in international waters from nutrient enrichment and other land-based activities;
3. Restored and sustained freshwater, coastal, and marine ecosystems goods and services, including globally significant biodiversity, as well as maintained capacity of natural systems to sequester carbon; and
4. Reduced vulnerability to climate variability and climate-related risks, and increased ecosystem resilience.

Chemicals and Waste: GEF's long term goal in chemicals and waste is to prevent the exposure of humans and the environment to harmful chemicals and waste of global importance, including persistent organic pollutants, mercury and ozone depleting substances, through a significant reduction in the production, use, consumption and emissions/releases of those chemicals and waste. Global environmental benefits resulting from GEF's objectives in the area of chemicals and waste include:

1. Protected human health and environment through the reduction and elimination of mercury use and prevention of anthropogenic emissions and releases of mercury and mercury compounds;
2. Protected human health and environment through the phase out of production and consumption of ozone depleting substances;
3. Reduced risks on human health and the environment through reducing and eliminating production, use and releases of Persistent Organic Pollutants and their waste; and
4. Reduced risks on human health and the environment through sound management of chemicals and waste of global concern.

Sustainable Forest Management: Multiple global environmental benefits addressing the emphasis placed by UNFCCC, CBD and UNCCD on the importance of conservation, sustainable use and management of forests, include:

1. Reduction in forest loss and forest degradation;
2. Maintenance of the range of environmental services and products derived from forests; and
3. Enhanced sustainable livelihoods for local communities and forest-dependent peoples.

29. Task environment

A **task environment** is the specific environment in which a company operates that affects how that company completes specific tasks essential to buying, selling, and delivering their products and services.
It is made up of suppliers, customers, distributors, and competitors:

- A **supplier** is someone that provides Choco Talk with ingredients or packaging essential to making their treats. Suppliers affect Choco Talk's ability to obtain products necessary for manufacturing their chocolate.
- **Customers** are the companies or persons who buy Choco Talk's products and can influence the sale and production of chocolate. Because what Americans like in their chocolate may be different than what Brazilians like, it is important for a company like Choco Talk to be aware of their customers' needs and interests.
- **Distributors** are in charge of delivering Choco Talk's products to their customers, and thus influence Choco Talk's ability to get their goods out. Because a distributor is essential to getting the products where they need to be, changes to a distributor's business and differences between global distribution laws and processes may affect how Choco Talk operates.
- **Competitors** are other companies selling products similar to Choco Talk who are interested in the same customers. More competitors can affect how much product Choco Talk sells. In the global environment, Choco Talk needs to be aware of both their local and international competitors.

30. Conclusions and Recommendations

- A natural resource is anything that people can use which comes from nature. People do not make natural resources, but gather them from the earth. Examples of natural resources are air, water, wood, oil, wind energy, hydro-electric energy, iron, and coal.
- We often say there are two sorts of natural resources: renewable resources and non-renewable resources. A renewable resource grows again and comes back again after we use it. this is like a rebounding ball .
- For example, soil, sunlight, water and wood are renewable resources.
- A non-renewable resource is a resource that does not grow and come back, or a resource that would take a very long time to come back. And this one is like a sin once done is done. For example, When we use coal, there is less coal afterward. One day, there will be no more of it to make goods.
- The non-renewable resource can be used directly (for example, burning oil to cook), or we can find a renewable resource to use (for example, using wind energy to make electricity to cook).
- It is important to conserve (save) non-renewable resources, because if we use them too quickly there will not be enough.
- Most natural resources are limited. This means they will eventually run out.
- A perpetual resource has a never-ending supply. Some examples of perpetual resources include solar energy, tidal energy, and wind energy.
- Other examples are salt, stone, magnesium, and diamonds.
- Some of the things influencing supply of resources include whether it is able to be recycled, and the availability of suitable substitutes for the material.
- Non-renewable resources cannot be recycled. For example, oil, minerals, and other non-renewable resources cannot be recycled.
- The demand for resources can change with new technology, new needs, and new economics (e.g. changes in cost of the resources).
- Some material can go completely out of use, if people do not want it any more. Demand of natural resources is very high, but availability is very low.
- Availability: All places have their own natural resources.
- When people do not have a certain resource they need, they can either replace it with another resource, or trade with another country to get the resource.
- Some resources are difficult to find, so people sometimes fight to have them (for example, oil resources).
- When people do not have some natural resources, their quality of life can get lower.
- So, we need to protect our resources from pollution.
- For example, when they can not get clean water, people may become ill; if there is not enough wood, trees will be cut and the forest will disappear over time (deforestation); if there are not enough fish in a sea, people can die of starvation.
- Some examples of renewable resources are wood, solar energy, trees, wind, hydroelectric power, fish, and sunlight.
- So humans should begin saving their natural resources. Or else, all will be lost and it will be difficult for humans to survive.
- The dramatic change in the economic and political environment raises new challenges for resource revenue management in developing countries.
- Global financial turmoil has triggered a sharp decline in prices.

- Volatility in commodity prices is affecting resource-dependent countries through a variety of channels which must be assessed on a case-by case basis.
- The wide swings in commodity prices will impact each country differently depending on its particular resource endowments.

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