PRACTICAL-NO:10

**AIM**: Define the terms renewable resource and non-renewable and give examples of each resource type that are related to forage production

**INTRODUCTION**:

The type of energy we use to power things like electricity and heating can have an impact on the environment. It is important to consider what energy source your supplier relies on in order to make environmentally friendly choices. Historically, we have relied mostly on fossil fuels such as coal, oil and natural gas for energy. However, this is a non-renewable energy source, which means it will eventually run out. Renewable energy is power that is generated from natural resources that are constantly replenished. By opting for renewable energy sources, we can help promote environmental sustainability.

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**Non-renewable energy sources**

**Fossil fuels:** Fossil fuels are non-renewable. This means that they will run out eventually, which is why the cost of energy is increasing. Coal, oil and natural gas are examples of fossil fuels. They're burnt to generate electricity - however, carbon dioxide is released during this process. Carbon dioxide is a greenhouse gas, which means it enhances the greenhouse effect and contributes to global warming. Using oil as an energy source has other environmental consequences, as oil spillages frequently occur which destroys marine life. Oil is currently refined to produce fuels such as petrol and diesel for transport. This again releases carbon dioxide emissions into the atmosphere.

**Nuclear:** This energy source uses naturally occurring radioactive material. Usually, uranium is manufactured into fuel rods for nuclear reactors. Neutron particles collide with the fuel rods and generate heat. This turns water into steam with drives turbines to generate electricity. Like fossil fuels, this is non-renewable. However, supplies are plentiful and this process does not produce greenhouse gases.

**Renewable energy sources**

**Solar:** Sunlight can produce electrical energy by using a photovoltaic cell. They are usually arranged in aluminium frames known as solar panels. They can be integrated into the cladding, roof tiles or glazing of a building. This is a free and unlimited source of energy. However, its effectiveness is determined by the number of hours of daylight, cloud and poor weather.

**Wind:** Wind turbines turn wind into electrical energy. Since the U.K. is the windiest country in Europe, there is a lot of potential for generating renewable energy from this source. Wind power is an intermittent source of energy, so sites for wind farms are chosen carefully to effectively generate power. They have a large visual impact on landscape and local residents often oppose plans to install them.

**Hydroelectric:** Hydroelectric energy generates electricity from flowing water using turbines and other devices. It's renewable and can be generated from rivers or manmade installations.

**Wave and tidal:** Energy from the sea is used to drive electricity generated turbines. Wave power uses the power from surface wave energy and tidal power is generated by tidal waters flowing through tidal barrages in estuaries. A tidal estuary is a partially enclosed body of water. They have one or more rivers or streams flowing into it, with connection to the open sea. Wave and tidal power is a renewable energy source, but there are concerns that tidal power generation will adversely affect marine and bird life in river estuaries.

**Geothermal:** As the core of the earth is hot we can use its geothermal energy as a renewable heat source or to generate electricity. This heat is accessible just a few kilometres below the earth's surface.

**What's the difference?**

The supplies of fossil fuels are limited. Therefore, relying too heavily on non-renewable energy sources is not sustainable. When fossil fuels are burnt, they release various pollutants such as greenhouse gases. The extraction process of fossil fuels also poses several environmental risks. For example, when transporting oil, there is a chance of spillages which destroy marine life. Mining for coal is an incredibly dangerous job as miners are exposed to toxic dust. However, there are advantages of using fossil fuels. They are relatively inexpensive to extract, portable and their effectiveness isn't dependent on weather conditions. Some people are also put off by renewable energy sources such as solar panels because of the high upfront cost of installing them. Despite these concerns, there are less maintenance costs associated with renewable energy sources. As supplies of fossil fuels begin to run out, the cost of extracting them will increase.The world-leading furniture retailer IKEA has been promoting renewable energy sources since 2018. In a bid to tackle climate change, IKEA pledge to produce as much renewable energy as they consume by 2020. They rely on solar power and have installed over 75,000 solar panels on their stores and other buildings. This is an example of business actively engaging with environmental problems and taking relevant measures to improve the impact they have on the environment. Their new business 'Home Solar' also aims to help customers transition to renewable sources of energy.

**EXAMPLE OF RENEWABLE RESOURCES**

1. **Solar energy**

Solar energy is a perfect example of a renewable resource. Our planet receives in a single hour the same amount of energy from the sun that the entire world’s population uses in one year!. If we captured and used all this energy at once, we would not deplete the solar power in any way. The sun will still keep on sending its energy our way every day, until it will cease to exist and our planet with it. Therefore, this resource is inexhaustible to our consumption rates.

1. **Wind energy**

Wind energy was amongst the first resources harvested by us to improve our livelihoods. Wind pushed our sailboats, and helped mills to grind grains or pump water. No one has really paid special attention to it – some days wind was blowing, some days not. But it has never crossed anyone’s mind that we would run out of wind.In principle, wind is just air that moves from high pressure to low pressure areas. The different pressures are created in response to changing temperature of the earth surface, which is affected by the amount of sunshine the area receives. This means that we can use wind as a source of energy for as long as the sun is shining on our planet, without having to worry about overconsuming this resource.

1. **Geothermal energy**

The temperature of the earth’s inner core is 5,430 degrees Celsius [2] and it is the hottest part of our planet. This heat is constantly radiating outward, making its way through the outer core all the way to the earth’s surface. This phenomenon is also referred to as geothermal activity. Once it reaches the surface, we can witness this proof of geothermal activity in the form of hot springs, geysers, volcanic lava flows, or steam vents.The potential to harvest this naturally generated energy is large, especially in areas where the heat can easily reach the surface, like at tectonic plate boundaries, or where the earth’s crust is thinner. For example, the magma chamber of the supervolcano under the Yellowstone National Park releases the same amount of heat into the atmosphere every day, like six industrial power plants produce to generate electricity.In areas with geothermal potential, we can easily make use of this renewable sources of energy for as long as the earth’s core stays hot.

1. **Water**

Water is one of the most important resources on our planet. Life without it would not be possible at all.Throughout the earth’s history, we have always had the same amount of water. This means that the water running from your tap today might have been drunk by a dinosaur some 200 million years ago. Water simply does not disappear, neither can be exhausted by us – it always completes a cycle to return in one form or other. **We cannot make more water than there already is**, and the amount we have is very limited. This means, if water becomes contaminated with toxic chemicals, or if it was misused for excessive irrigation projects, we are shortening the amount available for us.The fact that water does not replenish in the same way as other renewable resources do, makes scientists argue whether it belongs into this category or not. Perhaps it cannot be classified based on renewability at all, and should stand on its own as a nice example of nature’s great complexity. Although, one thing is sure – **the energy of moving water is a renewable source** of energy for us.

1. **Air**

The air we breathe is a carrier of compounds crucial for metabolism of all living organisms. Even our industrial processes depend on the access of oxygen as a catalyst to chemical reactions. The combustion of fossil fuels to supply our energy would not be possible without the access of oxygen, neither would be the ignition of a fire that enabled our ancestors to survive cold weather of the last ice age.This makes air one of the most important natural resources, which is to our advantage also considered a renewable resource. Even though modern anthropogenic activities pollute air at an unprecedented level, many vital natural processes such as photosynthesis are constantly replenishing clean air again.

For example, one acre of forest absorbs six tons of carbon dioxide emitted from industrial activities, and produces four tons of oxygen in exchange

**5 EXAMPLES OF NON-RENEWABLE RESOURCE RELATED TO FORAGE PRODUCTION**

1. **Coal**

Coal is one of the most used fossil fuels. It has formed more than 300 million years ago in swamps covered by water. Later, swamps dried up and all organic material in different stages of decay got buried underneath multiple layers of soil.Coal is non-renewable not only because the process of its creation took millions of years, but also because the climate on earth was completely different at that time. This means that we cannot replicate the same conditions to encourage creation of new coal reserves, and the deposits we have been overexploiting since the last century are quickly running out.

1. **Oil**

Oil is probably one of the most well-known non-renewable resources alongside coal. It is a liquid fossil fuel made up of fossilized animals (possible even dinosours) thousands of years ago. When extracting oil from the ground, it comes out in the form of black crude oil. Crude oil is then refined into different products we use on a daily basis such as gasoline, diesel fuel or heating oil The story of the oil’s downfall is similar to coal. Given that only in the United States an average of about 19.4 million barrels of oil is consumed every day, it is clear that we are using our oil reserves much faster compared to how fast nature can replenish them Already at this moment, scientists estimate that **oil is probably the least abundant fossil fuel**, which is likely to run out fairly soon.

1. **Peat**

Peat, commonly found in the UK, Ireland or Finland, is a soft organic material consisting of partly decayed plant matter together with deposited minerals Peat can be dried out and used as fuel but it is also an important raw material in horticulture and for potting. Some peat industry representatives and academics believe that peat is a slowly renewable resource, but in reality, a peat bog takes thousands and thousands of years to form. So, if one considers the rate at which peat is being used either for energy or as a growing medium, then it is evident that it is not a renewable resource.

Peat bogs are considered such important parts of our ecosystems that in most countries they are protected or considered conservation areas.

1. **Uranium**

You may have heard the ongoing debate over the renewability of nuclear plant. While some people claim that nuclear power on its own perfectly fits the definition of a renewable source of energy, it is uranium, the commonly used nuclear fuel, which does not fit into the scheme.Uranium is a radioactive element found in low amounts within all rocks on earth. It is a non-renewable resource because of its cosmic origin. The isotopes of uranium were formed 6.6 billion years ago in supernovas and do not naturally regenerate. In fact, the radioactive decay of the natural deposits of uranium is what keeps the earth’s core in a liquid form.Nuclear power plants use only one isotope of uranium (U-235) for fuel because its atoms are easily split apart. To get this naturally rare isotope, uranium ore has to be mined in large amounts and undergo the process of enrichment.Given today’s consumption rate where nuclear energy makes about 11% of all energy sources worldwide, the Nuclear Energy Agency estimates that we have around 200 years supply of uranium to run our reactors. After that, this resource is likely to run out.

1. Gold

The eternal symbol of wealth and power. This yellow shining metal has enchanted many great rulers in the history, and gave reasons to countless crimes, as if people have always known that there is something special about this precious metal.Indeed, there is!It was created from the collisions of neutron stars when our solar system was formed. Knowing the cosmic origin of gold offers probably a good-enough explanation why this resource is not renewable.Our history of using gold reaches as far as the rule of Egyptian pharaohs some 3,400 years B.C., followed by many periods of extensive exploitation of this resource – like the famous Gold Rush in 1850s. Even today, around 2,700 tons of new gold are mined every year. We don’t use gold only to satisfy our vanity, it is a great conductor of electricity needed for the manufacture of cell phones, computers and other high-tech devices. Gold is widely used in the medicine as well. Besides being a part of various treatments such as of tuberculosis or arthritis, it has been lately tested as a possible cure to cancer.While we keep increasing our dependence on gold, the natural reserves of this resource are thinning. It is only a matter of time until we hit that final deposit.