12th Geography Lesson 3 Notes in English

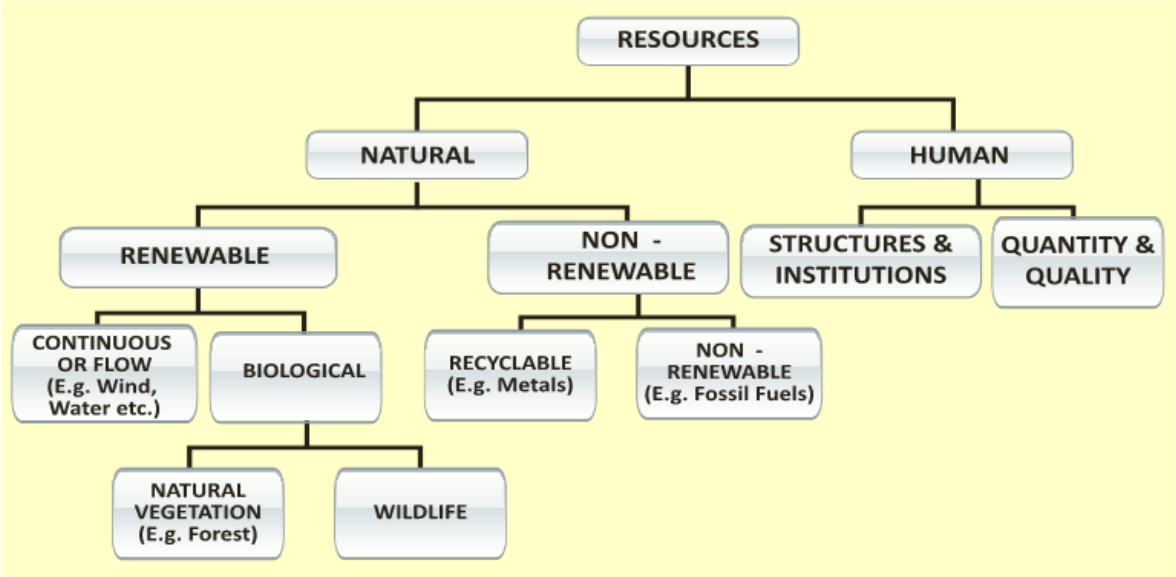
3] Resources

Introduction

- Have you heard about Voyager 1 launched in 1977 still is travelling at the speed of 62140 km/ hour or 17 km/sec.?
- Do you know what fuel is used in it? It is **hydrazine**. What, do you think, would be the future fuel?
- It is certainly going to be **hydrogen**.
- Think about how hydrogen stands as an **important future fuel**.
- A resource is a naturally occurring exploitable material that a society perceives to be useful to its economic and material wellbeing.
- Willing, healthy and skilled workers also constitute a valuable resource, but without access to materials such as **fertile soil** or **petroleum**, **human resources** are limited in their effectiveness.
- Resources are the basis of the economic development of any nation.
- Different countries are at different levels of economic development primarily because of the variation in the availability of natural resources.
- **The US** and **west European countries** are economically prosperous because they possess vast natural and human resources and technology.
- On the other hand, in most parts of **Africa** and **Asia**, though they are naturally rich in resources, due to their lack of knowledge, the resources are unutilised and they are not used in the service of man.

Classification of Resources

- Resources are classified on various bases. Based on the continual availability, resources are classified in to **renewable** and **non renewable resources**.
- The resources which can always be used again and again are known as **renewable resources.**
- It means these resources have **natural regeneration** and are **inexhaustible**. Air, water, solar energy etc are examples of renewable resources.
- **Non renewable resources** are available in **finite quantities** and **cannot be obtained** once if they are utilized.
- If these resources are used in large scale, they will get exhausted soon and as such these resources are called as exhaustible resources.
- Coal, oil and minerals are examples of this type.
- On the basis of origin, the resources are classified in to **biotic** and **abiotic resources**.
- When a resource is **originated from living organism**, the resource is known as **biotic resource**.
- Coal, mineral oil and forests are examples of biotic resources.
- **Abiotic resources** are composed of **non-living inorganic matter**. Air, land, water and minerals are examples of this type.

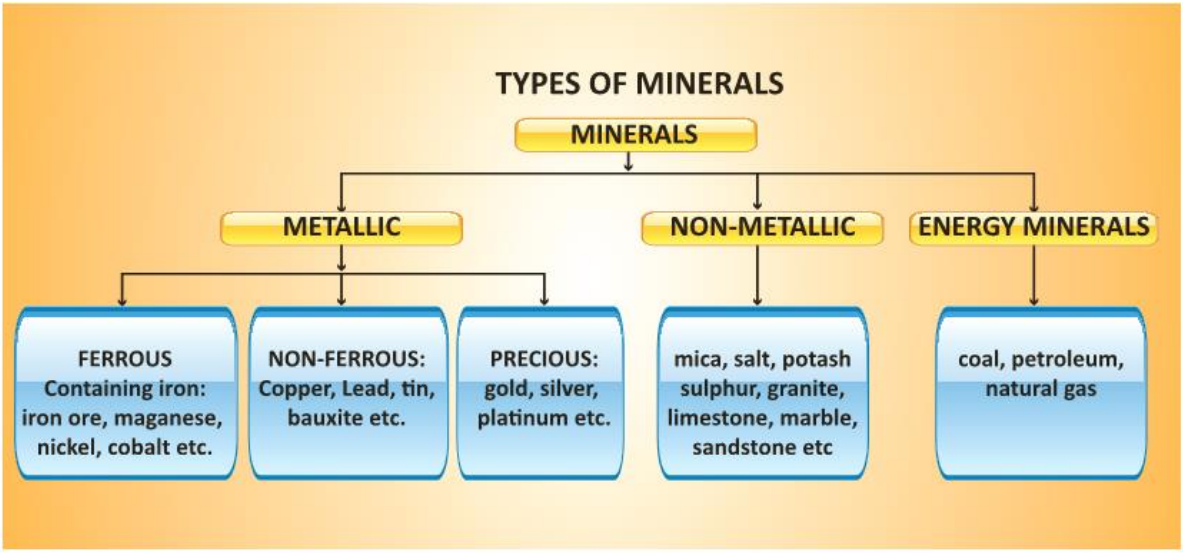


- On the basis of status of development, the resources are classified in to **potential resources** and **developed resources**.
- Potential resources are those which are known to exist and may be used in the future.
- Until the resource is extracted and put in to use, it remains a potential resource.
- Developed resources are those which have been surveyed and their quality and quantity have been determined for utilisation.
- The development of resources depends on technology and level of their feasibility.
- **Petroleum resource** from **Mumbai** High is an example of Developed resources.
- Apart from the above classifications, the resources which are available in nature are known as **natural resources** and the one created by man is known as **man-made resource.**
- Similarly the air like resources which exist everywhere is called as **ubiquitous resources** and the resources which are concentrated only at specific places are known as **localised resources**.
- This kind of resource may exercise great influence on the economic development of the respective regions.

Mineral Resources

- A homogeneous, naturally occurring substance which has a definite chemical composition is called **a mineral**.
- They can be identified by their **physical properties** and **chemical components**. Minerals exist in **different types** based on their formation. Minerals play an indispensable part of our daily activities.
- Almost everything we use, from a tiny particle to a huge building or a big ship all, is made up of minerals.
- Minerals are one of the **most valuable resources** of the earth. All the stages of human development or progress have been named after them.
- For example, **stone age, copper age, bronze age** and **Iron Age.**

- They are exhaustible or non renewable. Besides, they are distributed very unevenly. They are generally found in the form of ores.
- The ore contains several impurities. Minerals are separated from the ores involving a number of distinct processes.
- A country's economic development is depending on the minerals.
- There are several types of minerals, but according to their characteristics and commercial use.



Uses of Minerals

- Minerals are basic and essential raw materials in our daily lives and are vital for **economic, social** and **technological development**.
- They are used, in the construction of **buildings, bridges** and **settlement**.

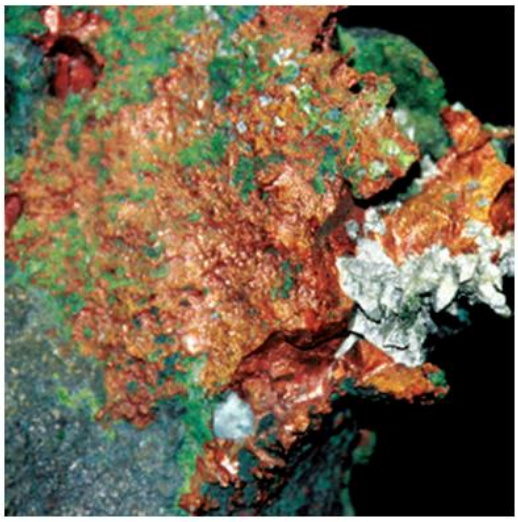
As raw materials in industries

As fuels

1. In the manufacture of **defence equipments**.
2. In the **field of communication** like manufacturing telephone, wires, cables, electronic devices etc.
3. In making of **alloys** for various purposes.
4. In making of **ornaments**.
5. In the manufacture of **fertilizers**, **pesticide**, **fungicides** etc.

Mode of Occurrence of Minerals

- Minerals are generally found in '**Ores**'.



Copper Lodes

- It is actually an accumulation of any mineral mixed with other elements.

Gold veins

- Minerals generally occur in **many forms**. They are

1. Veins and lodes

- Minerals generally occur in the cracks, crevices, faults and joints of **the igneous** and **metamorphic rocks.**
- Minerals in smaller occurrence are called a **'Vein'** and a larger occurrence is called a **'lode**, for example, Copper and Gold are found in lodes and veins.

2. Beds or Layers

- Minerals that are formed as a **result of deposition**, accumulation and concentration generally occur in **horizontal layers**. E.g. Coal, Potash, etc.

Coal

Bauxite

Residual mass of weathered particles

- When the **decomposed rocks** are washed away by water, the soluble particles are removed, leaving a mass containing ores.
- Such occurrences are called **residual mass**. E.g. Bauxite

3. Alluvial deposits or placer deposits

- These are the **deposits found in the sands of valley** floor and at the foot hills.
- These deposits consist of **the minerals** such as Gold, Silver and Platinum.

Platinum

The world distribution of minerals

Metallic Minerals

- The minerals which contain metal in them are called as **metallic minerals**.
- **Iron - Ore** It is the basic mineral and the backbone of industrial development of the world.
- Iron Ore is the most widely distributed element of the earth's crust and it rarely occurs in a free state.
- It is found as the **composition of many rocks** and **minerals**.
- Iron-ore makes up 4.6% of the earth crusts.
- Iron is found in the form of Iron - ore.
- They are classified into 4 categories.

I. **Magnetite**: It is red in colour and has 72% of pure Iron
II. **Hematite**: It is black in colour and has 70% of pure Iron
III. **Limonite**: Its colour varies from dark brown to yellow and has 50% of pure iron.
IV. **Siderite**: It is brown in colour and contains only 30% of pure iron is present.

- The iron content of these ores is highly variable.
- If the iron content is less than 30% in an ore, it is considered to be uneconomical.
- Iron is mixed with fixed proportions of Manganese, Nickel, Chromium or Vanadium to make different varieties of steel.

Distribution of Iron ore

- Iron - ore is **unevenly distributed** in the world.
- **Good quality Iron ore** is found in Australia, Brazil, Russia, China, USA, Ukraine, Canada, etc.
- **Russia** has the **largest proven reserves** of iron ore in the world.
- **Australia** is the **largest producer** of Iron ore in the world. Other leading producers are China, Brazil, India and Russia.
- The Majority of Iron ore is (84%) produced by 5 countries alone.

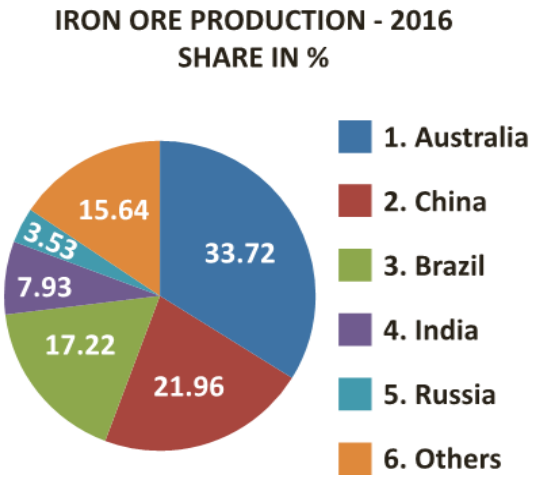
Iron ore

Rank	Country	Production (Metric Ton)	Share (%)
1	Australia	531,075,350	33.72
2	China	345,841,000	21.96
3	Brazil	271,275,900	17.22
4	India	124,852,650	7.93
5	Russia	55,550,000	3.53
Others			15.64

Major Iron ore fields in the world

Country	Iron ore fields

Australia	Mt. Bruce, Mt. Goldsworthy, Mt. Whaleback, etc.
China	Manchuria Region, Shandong, Sinkiang region, etc.
Brazil	Itabira in south east region.
India	Chhattisgarh and Bastar region, Odisha, Chitradurg, Kudremukh, Mayurbbanj region, etc.
Russia	Ural region, Kuzbas, Angara, etc.
U.S.A	Mesabi range, Marquette range, Cornwall, Albama, Appalachian region, etc.
Germany	Rhur basin.
Ukraine	Krivoi rog.



Manganese ore

- It is a kind of **Ferro-alloy** used to manufacture **the special quality steel**.
- A little manganese added to iron, removes gases and acts as a **'Cleanser'** in the manufacturing process.
- Nearly 6 Kg of manganese is used for making one ton of steel.
- **Manganese** is used for special quality steel making; it makes steel anti - corrosive, hard and clean.

- It helps to increase toughness, strength and durability to **resist oxidation** in blast furnaces.
- It is used to produce alloys with Copper, Bronze, and Nickel.
- It is used for producing heavy machinery, tools, bleaching powder, insecticides and paints.

Distribution and production of Manganese ore

- South Africa, Australia, China, Gabon, Kazakhstan, Brazil, India, Ghana, Ukraine and Mexico are the major countries possessing manganese ore.
- **South Africa** is the largest producer of manganese ore in the world, followed by Australia.
- The other leading manganese producers are China, Gabon and Brazil.
- **India** is **the 8th largest producer of manganese** in the world though it possesses the largest reserves of manganese in the world.

Manganese -ore production in 2016

Rank	Country	Production (Metric Ton)	Share (%)
1	South Africa	4,754,560	30.84
2	Australia	2,388,500	15.50
3	China	2,150,000	13.95
4	Gabon	1,658,500	10.76
5	Brazil	1,141,684	7.41
Others			21.54
SOURCE: World mining data -2018			

Copper

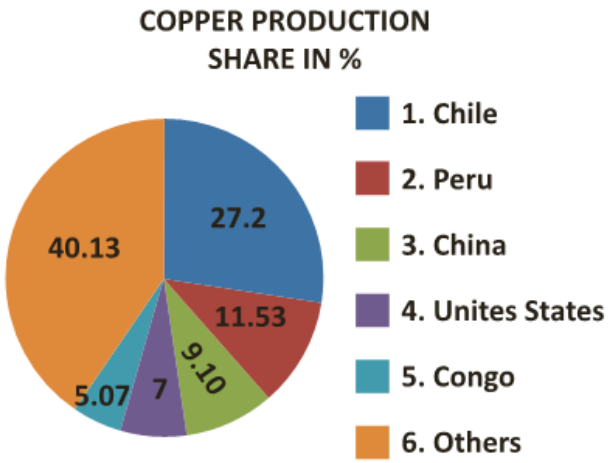
- It is a **non - ferrous**, soft brown metal. It is a **good conductor**, with high luster, density and melting point.
- Copper occurs in **three forms as native metal** in its pure state, as oxides and as sulphide.
- The chief ore of copper is **copper pyrite**. It yields nearly 76% of the world production of copper.
- Copper is extracted by the process of crushing, concentration, roasting, smelting and refining.
- It was discovered in **the earliest stage of civilization**. Copper is one of the first metals known and used by man.
- It is found in the **igneous** and **metamorphic rocks**.
- Copper is unfortunately very soft, but by mixing with tin, bronze can be obtained and mixing with zinc, brass can be obtained which is harder and tougher than pure copper.
- Copper is used in
  1. **Electrical Engineering**

2. **Metallurgical Industries**
3. **Making of alloys** and making tubes, pipes, pumps, radiators and boilers.

- They are also used in the production of a wide range of ornamental materials.

Production and distribution of Copper

- **Copper deposits** are found in almost every country.
- The main producers are Chile, Peru, China, USA and Congo. Chile is **the largest producer of Copper in the world**.
- It produces 27.20% of the world Copper, followed by Peru, which produces 11.53%.
- India holds 35th rank and it produces only 0.15% of the world's production.



Copper

Rank	Country	Production (Metric Ton)	Share (%)
1	Chile	5,552,600	27.20
2	Peru	2,353,859	11.53
3	China	1,851,000	9.10
4	United States	1,430,000	7.00
5	Congo	1,035,631	5.07
Others			**40.13**
SOURCE: World mining data - 2018			

Bauxite

- Bauxite is an important ore which is the main source of **Aluminum**.
- It is an **impure raw material**.
- It generally occurs as an ingredient of chemical compounds in highly complex minerals such as **Cryolite**, **Corundum** and **Kaolin**.
- Bauxite occurs quite near the surface and is generally mined by open cast method.
- It has a wide range of applications which include construction of buildings, utensils and airplane parts.

Production and world distribution of Bauxite

- The main **Bauxite producers** are Australia, China, Brazil, Guinea and India.
- The World's greatest Bauxite producers and exporters are the countries located in **the tropical** and **sub tropical region**.
- **Australia** is **the largest producer** of bauxite in **the world**.
- **India is the 5th largest producer** of bauxite in the world.

BAUXITE (ORE)

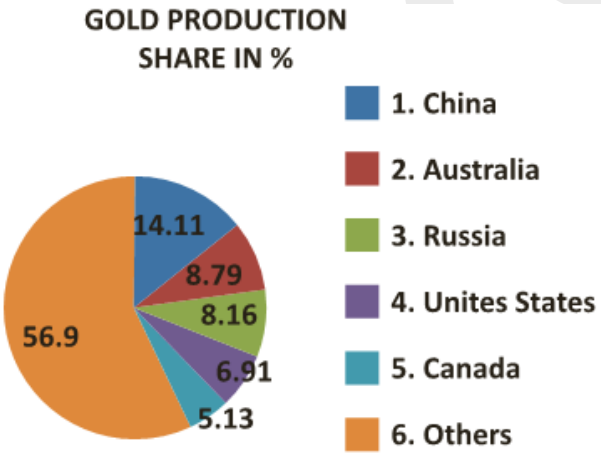
Rank	Country	Production MT	Share in%
1	Australia	83,516,578	29.31
2	China	65,000,000	22.81
3	Brazil	39,244,200	13.77
4	Guinea	31,117,131	10.92
5	India	24,664,632	8.66
Others			14.53

Gold

- Gold is a **precious metal** which occurs in alluvial or placer deposits or as reefs or lodes in the underground.
- Gold is used extensively for **jewellery** and also in dentistry, glass and porcelain dyes, in medicines and other industries.
- The purity of gold is expressed in terms of **carat**.
- China, Australia, Russia, USA and Canada are the leading producers of gold in the world.
- **India ranked 33rd position** in the **gold production** in 2016.

Gold

Rank	Country	Production MT	Share in%
1	China	453,500	14.11
2	Australia	282,421	8.79
3	Russia	262,380	8.16
4	United States	222,211	6.91
5	Canada	165,034	5.13
Others			56.90



Platinum

- Platinum is a **rare metal**. It is **costlier than gold.**
- It has a **very high melting point**.
- It is a heavy, malleable, ductile, highly inactive, silverish, white transaction metal.
- It is one of the densest metal almost twice as dense as lead.
- Platinum is found with other rare metals such as osmium, Palladium, Iridium and rhodium.
- Platinum is also used in industrial applications.
- **South Africa** is the largest producer of platinum in the world.
- The other leading producers are **Russia, Zimbabwe, Canada** and **USA**.

Platinum

Rank	Country	Production Kg	Share in%
1	South Africa	133,241	71.75

2	Russia	21,860	11.77
3	Zimbabwe	15,110	8.14
4	Canada	9,300	5.01
5	USA	3,891	2.10
Others			1.33

Non- metallic minerals

- The minerals which do not contain metal in them are called as **non metallic minerals**.

Mica

- Mica is a Latin word **micare** means to shine, to flash or to glitter.
- Mica has a **crystalline** and **layered structure** and can be split into very thin sheets.
- It does not react to water, acids, oil or solvents.
- It is lightweight, flexible and strong.

Mica

- It can **resist extremely high temperatures** or sudden changes in temperature and is able to withstand high voltages and insulate with low power loss.
- It can absorb or reflect light, which enables a decorative effect and protects against ultra-violet (UV) light.

Major Uses of Mica

- Mica has several applications. There are several main sectors where the use of mica is identified.

- They are the paint and coatings sector, Cosmetics and personal care companies, Plastics and printing ink manufacturers, the electronics sector, the automotive sector, the construction industry and the oil industry.

Phosphate

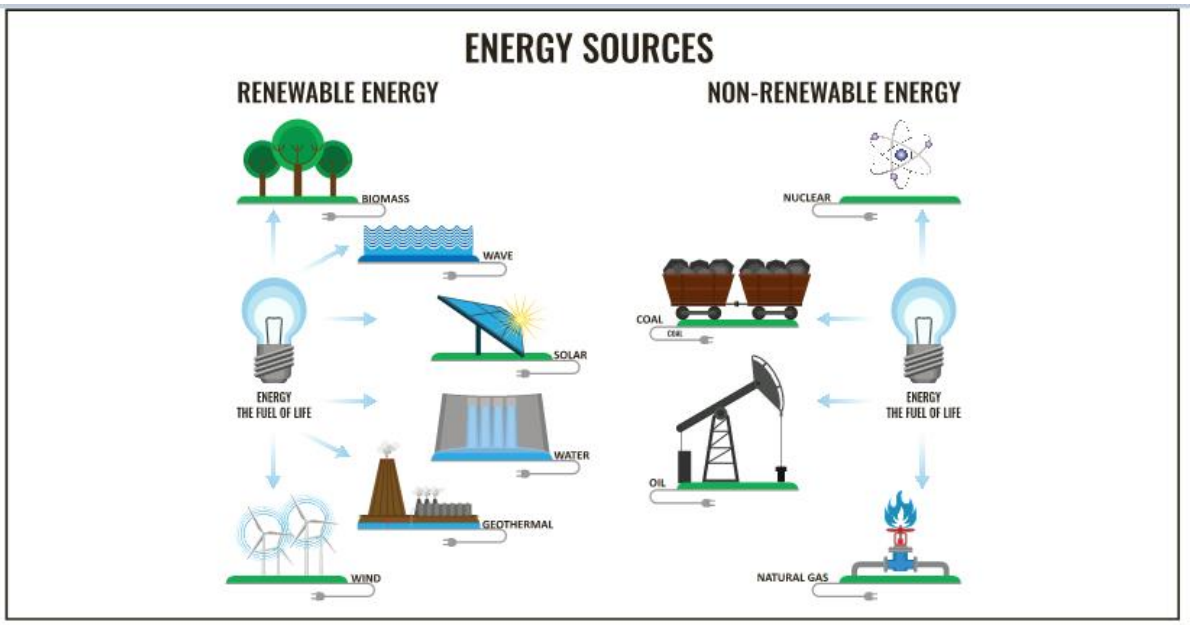
- Phosphate occurs in **the sedimentary rocks** or as phosphate nodules. Another source is bird dropping of Guano.
- It is the most important source of phosphorus. It is mainly used in **fertilizer**.
- **China** is the largest producer of Phosphate in the world. The other leading producers are Morocco, USA, Russia and Peru.
- **The Guano deposits** are found in Peruvian and Chilean deserts in South America. India is the 20thlargest producer of Phosphate in the world.

Phosphate (2016)

Rank	Country	Production MT	Share in%
1	China	43,319,400	51.58
2	Morocco	8,601,000	10.24
3	USA	7,615,000	9.07
4	Russia	48,36,000	5.76
5	Peru	4,013,220	4.78
Others			18.57

Energy Resources

- Resources may be classified into **renewable** and **non renewable resources**.
- Mineral resources like coal, Petroleum and natural gas are the exhaustible or non renewable resources.
- They cannot be replaced once they are consumed.
- Coal and petroleum are **the fossil fuels**, on which the modern culture relies so much.
- Energy gives motion to our **industrial machines** and **vehicles**. It is the primary input in the production of goods and services.
- The wheel of progress moves with **the flow of energy**. The energy resources may be classified into two types.



(i) Non renewable sources of Energy

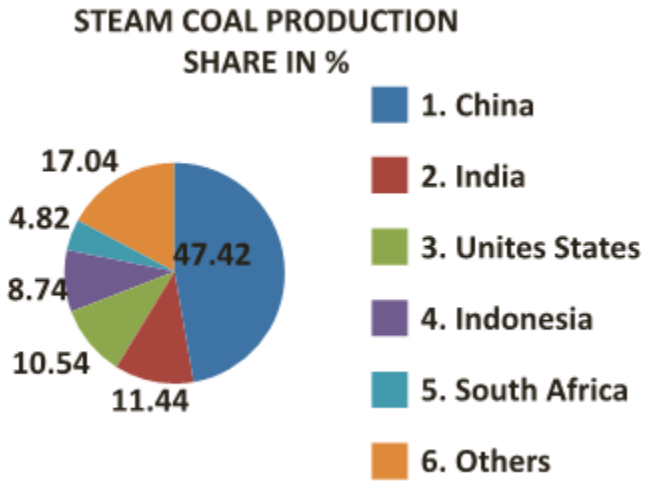
- Once these resources are used, they cannot be regained again.
- In other words, they are **exhaustible**.
- They are **coal**, **Petroleum natural gas** and **atomic fuels**.

Coal

- Coal is **a fossil fuel**. It is a flammable, black or brown sedimentary rock and is mainly composed of carbon.
- It is the altered remains of **prehistoric vegetation** that originally accumulated in swamps and peat bogs.
- **The dense forest plants** were converted into coal due to intense pressure and heat inside the earth by the process of carbonization.
- Most of the coal resources of the world were formed during the carboniferous period (280 to 350 million years ago).
- The quality of the coal is determined by its **carbon content**.
- The following types of coal have been identified on the basis of their physical properties. They are,

I. **Peat** is the first stage of transformation of wood into coal and it has only 30 to 35% of carbon.
II. **Lignite or Brown coal** is the inferior quality and contains 35-45% carbon
III. **Bituminous or coking coal** is the second best variety of coal and contains 70-90% of carbon. It is the most widely spread and most widely used variety of coal. It is the most popular coal in commercial use.
IV. **Anthracite** is the best quality coal, which contains more than 95% of carbon. It is very hard but emits very less smoke and leaves very less ash. However its deposits are limited.

Production and world distribution of Coal



- Coal reserves are found in more than **70 countries of the world** but the major coal reserves occur in the USA, Russia, China and South Africa.
- **China** is the largest producer of steam coal in the world followed by India.
- The other **leading producers of steam coal** are USA, Indonesia, and South Africa etc.
- Steam coal – It is used for producing steam and it has high sulphur content Steam

Coal

Rank	Country	Production (Metric Ton)	Share in%
1	China	2,491,793,000	47.42
2	India	601,131,000	11.44
3	United States	553,936,000	10.54
4	Indonesia	459,469,000	8.74
5	South Africa	253,452,000	4.82
Others			17.04

Coking Coal

Rank	Country	Production MT	Share in%
1	China	591,998,000	54.67

2	Australia	189,302,000	17.48
3	Russia	83,800,000	7.74
4	India	61,661,000	5.69
5	United States	50,645,000	4.68
Others			9.74

Major coal mining centres

Country	**Mining centres**
China	Shansi, Shantung, Fushun, Shenyang, etc.
India	Bokaro, Jaria, Korba, Ranikanch, Singreni, etc.
U.S.A	Arkansas, Colorodo, Illionois, Indiana, Michigan etc.
Australia	Bowen Basin, Brisbane, Canberra, Sydney, New-castle, Tasmania, etc.
Russia	Moscow-Tula region, Chokot Basin, Ob basin, etc.

Trade

- The main **exporters of coal** in the world are Australia, Indonesia, Russia, Colombia and South Africa and the main importers are China, India, Japan, Korea and Germany.

Uses of Coal

- Man has used **coal for hundreds of years**.
- But it has gained importance only after **industrial revolution**.
- It contributes about **25% of global energy demand**.
- Coal is used for various purposes. It is used as a source of steam energy, electrical energy, domestic fuel, metallurgical coke, chemical industries and by products such as Ammonium sulphate, Naphthalene, Phenol, Benzene, etc.

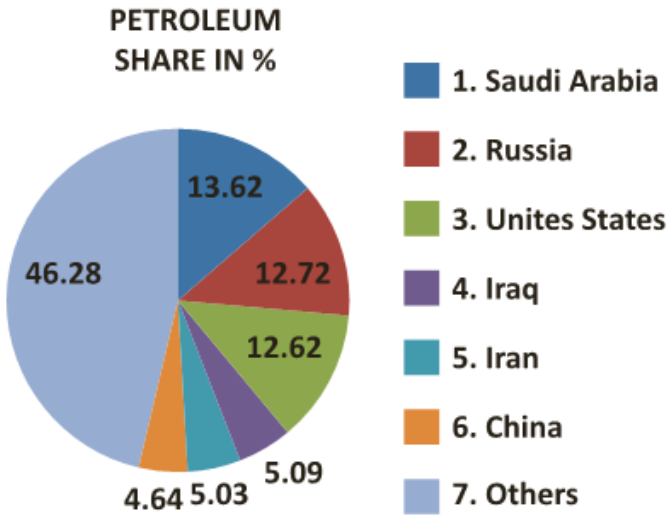
Petroleum (or) Mineral oil

- Petroleum is a **mineral** that exists under the surface of the earth in liquid, solid and gaseous forms.
- **Liquid petroleum** may be in the form of crude oil. The solid form may be mineral waxes or asphalts.
- The gaseous form is **natural gas**. It is a main source of energy in the World due to its multiple uses.
- The human activities are directly or indirectly depend on the use of petroleum or its sub products.

Formation and occurrence of mineral oil

- It is formed by **slow chemical** and **bio chemical decomposition** of the remains of organic matter in sedimentary rocks.
- It is found in the pores of the sedimentary rocks. **Oil is lighter** than water hence, floats over water.
- **Drilling of oil wells** is the hole drilled in the earth's crust and when it reaches the rock cap, the natural gas comes out first with a great pressure.
- When the pressure of gas subsides, petroleum starts flowing out when the pressure of natural gas is released.

Petroleum reserves of the world



- **The west Asia** or **Middle East** is has the largest petroleum reserves, which is about 60% of the world's oil reserve.
- The total estimated world's oil reserves in 2008 were 1,243 (109 bbl).
- Saudi Arabia, Canada, Iran, Iraq and Kuwait have large reserves of petroleum. Production and world distribution of petroleum
- **The petroleum producing countries of the world** can be grouped in to five geographical regions:
  I. **West Asia (or) middle East region**
  II. **American region**
  III. **Russian region**
  IV. **East & south Asian region and**
  V. **African region Saudi Arabia** is the largest oil producer of the world with 13.62% of the world output of oil.
- **Russia** is the second largest producer in the world.
- **India** is placed at 24th position in petroleum production in the world.
- The distribution of oil is naturally uneven; **Middle East** contains 60% of global reserves and rest of the world only 40%.

Petroleum

Rank	Country	Share in%
1	Saudi Arabia	13.62
2	Russia	12.72
3	USA	12.62
4	Iraq	5.09

5	Iran	5.03
6	China	4.64
Others		46.28

Trade

- The world **leading exporters** of petroleum are Saudi Arabia, Russia, Iraq, UAE and Canada and the main importers are USA, China, India, Japan and Korea.

Major Petroleum production centres

Country	Production centres
Saudi Arabia	Ghawar, Abquiaq, Abuhadriya, etc.
Russia	Volga- Caspian region, Kamchatka-Sakhalin region, Ob – Lena basin.
U.S.A	Tennessee- New york, ohio, Indiana, Pennsylvania, Texas, Mississippi, Gulf of California, etc.
Iraq	Kirkuk, Mosul, Daura, etc.
China	Taching, Chinchou, yemen, South china sea, etc.

Natural Gas

- It is the **cheapest source** of energy.
- It is found along with or without petroleum.
- It is considered as an environment friendly fuel because of its low carbon dioxide emissions.
- Therefore, this is the only fuel for the present century and it is also called green energy.
- A powerful odorant, **ethanethinl** is added, so that leaks can be detected easily.
- It is prepared by refining petroleum or wet natural gas.

Natural gas reserves and Production

- The known **natural gas** reserves in the world is about 6254 trillion cubic feet.
- Most of these reserves are found in Russia, Iran, Qatar, UAE, Saudi Arabia, USA etc.

- USA has **the largest reserve** and is **the leading producer of natural gas** in the world followed by Russia.
- **India** is the 28th producer of natural gas in the world. It is widely used as a fuel in industries and domestic cooking purposes.
- **Petrochemical industries** use it as fuel and raw material. It is also used in chemical industries, artificial rubber, plastic, fertilizers, ink, and carbon and as artificial lighting.

Natural gas

Rank	Country	Production (Metric. Ton)	Share (%)
1	United States	755,010	20.56
2	Russia	641,000	17.45
3	Iran	202,440	5.51
4	Qatar	181,250	4.94
5	Canada	157,179	4.28
Other			47.26

Trade

- Russia, Qatar, Norway, Canada and Algeria are **the leading exporters** of Natural gas in the world.
- Japan, Germany, China, Italy and Turkey are **the leading importers** of natural gas.

Nuclear Energy

- It is commonly said, this energy holds the key of future. Energy contained within the nucleus of an atom is called **nuclear energy**.
- Heavy metals like Uranium, Thorium, Radium, Plutonium and Lithium are **the main sources of nuclear energy.**
- However **Uranium** is the most important source of nuclear energy.
- The nuclear energy production was started **first in USA** in **1950**.
- Nuclear energy now provides about 11% of the World's electricity.
- At present there are more than 450 operable fission reactors in the world.
- The world's first commercial nuclear power station **Calder Hall** at Wind scale, **England** was opened in 1956.

Uranium (U3O8)

Rank	Country	Production (Metric. Ton)	Share (%)
1	Kazakhstan	29,113	38.89
2	Canada	16,666	22.26
3	Australia	7,352	9.82
4	Namibia	4,308	5.75
5	Niger	4,101	5.48
Others			17.80

Renewable sources of Energy:

- All regions of the world are facing **the twin problems** of fast increasing demand for energy and limited supplies and rapidly depleting conventional sources of energy.
- Under these circumstances, **non conventional sources of energy** are getting more importance.
- These sources are **renewable, clean** and **non-polluting**.
- They are solar, wind, geothermal, wave, tidal energy, bio-gas etc.

Hydel Power

- **Hydro electricity** is produced by using **the potential energy of water** falling from a certain height.
- The falling water spins the turbine blades and energy is produced.
- It is a clean **eco friendly** and **renewable source of energy**.
- It contributes nearly 7% of the world electricity production.
- China has the largest potential followed by Brazil, Indonesia, Canada and Zaire.
- **China** is the largest producer of Hydro electricity in the world, followed by **Canada**.

Solar energy

- It is based on **mechanical conversion** of solar energy into electricity.
- It is available in abundance but only in the recent period it gets more importance due to technological development.
- Solar energy is used for various purposes.
- **USA** is the major producer of **solar cells** at present.
- It is simply **the energy provided by the sun**, which makes production of solar electricity possible.
- Solar power in **India** is a fast developing industry.

- The country's solar installed capacity reached 26 GW as of 30 September 2018.
- India expanded its solar- generation capacity 8 times from 2,650 MW on 26 May 2014 to over 20 GW as on 31 January 2018.
- The country added 3 GW of solar capacity in 2015-2016, 5 GW in 2016-2017 and over 10 GW in 2017-2018, with the average current price of solar electricity dropping to 18% below the average price of its coal-fired counterpart.

Wind Energy

- The wind is a clean, free and readily available **renewable energy source**.
- Wind turbines are capturing the wind's power and converting it to electricity.
- Wind power has become a pillar in their strategies to phase out fossil and nuclear energy.
- Wind energy is now the second fastest growing source of electricity in the world.
- It fulfils about **5% of world's electricity demand**.
- The world's largest wind farm is in Altamont pass in **California**.
- **India** is emerging as a **major wind power producer** of world.
- The important wind farms in India - (i).The largest wind farms in India are **Muppandal** in **Kanyakumari** District of **Tamil Nadu** and **Jaisalmer** wind park in **Rajasthan**.
- They are the first and second largest wind farms of India.
- Based on the location of its generation it is classified into

I. **Onshore wind energy and**
II. **Offshore wind energy**

1. Onshore wind energy –

- Energy generated from **the plants located on the land** is known as **onshore wind energy.**
- Onshore wind has the advantage of being one of **the most affordable renewable energy sources**.
- It is cheaper than any other renewable source of energy but it requires more area to install than any other energy.

2. Offshore wind energy –

- It refers to the use of wind farms developed in **seas** and **oceans**.
- The largest offshore wind farms are currently in **the U.K** and **Germany**.
- These two countries installed 2/3 capacity.
- **London** Array is the largest offshore wind farm in the world.
- The first offshore wind farm is planned near **Dhanuskodi** in **Tamil Nadu**.

Tidal energy –

- It is a renewable energy powered by **the natural raise** and **fall of ocean water**. Its production is very small.
- The first tidal power station was located in La Rance in **France**.

- The largest tidal power station is at Sihwa Lake in **South Korea** and it is the largest **tidal power producer** in the world.
- There are three different category of sources from which the tidal energy is generated.
- The sources are **tidal streams, barrages** and **tidal lagoons**.
- India's first attempt to harness tidal power for generating electricity would be in the form of a 3MW plant at the Durgaduani creek in sunderbans delta of **West Bengal**.
- **The Gulf of Kutch** and Cambay in Gujarat and the Ganges delta in sunderbans, the world's largest mangrove, are the 3 sites identified as potential areas for tidal power generation in India.

Geo Thermal Energy

- Geo thermal energy is derived from **the natural heat of the earth**.
- **The United States** is the world's largest producer, and the largest geothermal development in the world is The Geysers north of San Francisco in **California**, the U.S.
- In **India**, exploration and study of geothermal fields started in 1970. The GSI (Geological Survey of India) has identified 350 geothermal energy locations in the country.
- The most promising of these is in Puga valley of **Ladakh**.
- The estimated potential for geothermal energy in India is about 10000 MW.
- There are **seven geothermal provinces** in India: the Himalayas, Sohana, West coast, Cambay, Son- Narmada-Tapti (SONATA), Godavari, and Mahanadi.

Conservation of Resources

- It takes millions of years for **the formation of minerals**.
- Compared to the present rate of consumption, the replenishment **rate of minerals** is very slow.
- Hence, mineral resources are **finite** and **non- renewable**.
- Due to this, it is important to conserve the mineral resources.

Ways of Conserving Resources

- Controlling population growth will reduce the demand for resources.
- Creating social awareness regarding the importance of conservation of resources.
- Reusing and recycling of resources.
- Using the renewable source of energy as an alternative to non- renewable resources.
- Developing the usage methods which minimize the wastages.
- Propagating the environmental ill effects caused by various products.
- Choosing the products with less packaging

MORE TO KNOW:

Fool's Gold

- Fool's Gold refers to pyrite of **Iron Sulphide** because of its similarity in shape and colour to actual gold.

Agencies exploring minerals in India

- Agencies involved in the exploration of minerals in India. GSI, ONGC, MECL, NMDC, IMB, BGML, HCL, NALCO are the departments involved in mining in different states of India.

Why is hydrogen used as fuel in rockets?

- **China** was the largest producer of coking coal in the world in 2016 followed by Australia.
- The other leading producers of coking coal are Russia, India and USA.

OPEC

- OPEC is the short form of the "**Organisation of Petroleum Exporting Countries**.
- It was formed in 1960 at **Bagdad convention.**
- Initially it comprised of Saudi Arabia, Iran, Iraq, Kuwait and Venezuela.
- Later on added in eight countries Libya, Algeria, Qatar, UAE, Nigeria, Ecuador and Angola, Indonesia left from OPEC in recently.

Nuclear accidents

- Most devastating 1. **Three mile Island**- March 28, 1979 USA 2. **Chernobyl** - April 29,1986,Russia 3. **Fukushima** Daiich- March 11,2011,Japan

Noor Complex

- Noor Complex is the world's largest concentrated solar power (**CSP**) plant, located in **the Sahara Desert.**

Kamuthi, the World's largest single solar power plant!

- Kamuthi Solar Power Project is **a photovoltaic power station** spread over an area of 2,500 acres (10 km^2) in Kamuthi, Ramanathapuram district.
- The project was commissioned by **Adani Power**.
- With a generating capacity of 648 MW at a single location, **The Kamuthi Solar Power Project** was completed on 21 September 2016.
- Around 8,500 workers installed an average of 11 MW of capacity per day to complete the project within 8 months.
- The entire solar park is connected to a 400 kV substation of **the Tamil Nadu Transmission Corp.**
- The solar panels are cleaned daily by **a self-charged robotic system**.