Chapter 2

Natural Resources & Associated Problems.

* **Resources** - The environmental factors which fullfill the needs of human & help to improve life style are called resources.
- Development of any nation depends upon the quality & quantity of resources.
- Due to increasing industrialisation & urbanisation caused deterioration of natural resources.
- If it continues in future, human will be unable to fullfill their basic needs.
- There is need of sustainable development without imbalancing environment.

Natural resources

- Renewable
- Non-renewable

a) **Renewable resources**

Defⁿ The resources which are ample in nature or if they are used once then these resources regenerated by natural processes or by human activities.

e.g solar energy, wind energy, OTEC (Ocean thermal energy conversion), Geothermal etc.

b) **Non-renewable resources.**

Defⁿ These resources are available in limited quantities on earth. These ~~+~~ which are exhausted after using once they can-not be regenerated easily.

e.g coal, oil

* **Forest Resources**

Forest french word foris means outside.

Forest is a biotic community (all living organisms).

Russia - largest cover - 49 %.

Amazon - largest forest

- Plays an important role in the economy of any country.
- It is highly complex, changing environment made up of a

living & non-living things

- Living things includes trees, shrubs, wildlife.
  Non-living things include water, nutrients, rocks, sunlight, air.
- Forest are important to humans & the natural world or humans.
- They provide fuel, wood, timber, wildlife, forest product.

Functions of forests

1. Protective functⁿ
2. Productive
3. Regulative
4. Social

1. Protective function

Apart from providing wood & other products, forests & trees outside forests play a protective role, for instance in ecosystem conservation

(b) in maintaining clean water
(c) reducing the risks of impacts of floods
(d) erosion & drought.

Protective function can be local or global & include:

1) Influence on climate
2) Protection from wind erosion
3) Coastal protection
4) Protection from avalanches.
5) Air pollution filters
6) Protecting water resources.

2. Productive function

Forest provides raw material to a large number of industries. e.g paper & pulp, plywood & other board, saw mills, furniture making, packing cases, match boxes & toys. A large number of non-wood products are also available from forests.

3. Regulative function.

- The forest protects land & soil from erosion caused by rain, wind & radiation, as well as flora & animals from overexploitation (अतिशोषण).
- It's also known as the forest's regulating functions.
- Absorption, storage, release of carbon, oxygen, nutrients, radiant, thermal energy are forest's other functions.

4. Social function

- The forest creates the environment favourable to the health & recreation of society, enhances the labour market, strengthens national defence, improves environmental awareness & culture of society.
- It is extremely difficult to measure the economic value of the non-productive functions of the forest.

* Use & over exploitation (शोषण)

Uses of forest

1. Fuelwood - For the rural population, wood is an important source of energy for cooking & heating.
2. Fodder - An important source for cattle & other grazing animals in the hilly.
3. Wind breaks & shelter belts.
4. Soil erosion
5. Soil improvement.

Exploitation

The factors affecting the exploitation of forest resources as identified by the rural households were deforestation, bush burning, urbanization, land degradation/erosion, losses due to bad market, high transportation cost, community laws, land ownership.

Reasons of exploitation

- with increasing population increased demand of fuel wood expansion of area under urban development & industries.

* **Deforestation**

Deforestation is the removal of a forest or stand of trees from land that is then converted to non-forest use.

Causes

- Agricultural expansion
- wood extraction
- Infrastructure expansion (road building & urbanization).
- Timber logging
- mining
- Climate change

Effects

The loss of trees & other vegetation can cause climate change, soil erosion, flooding, increased greenhouse gases in the atmosphere

Disadvantage

- An increased amount of carbon dioxide emissions & soil erosion.
- The loss of biological diversity of both plants & animals.

Importance

Important for removing carbon dioxide from the air. Clearing the forests also produces greenhouse gas emissions.

* **Timber extraction**

Causes

- Insufficient political actions & governance failure, corruption, wrong public administration investments.
- Political & socio-economic causes as population growth, military conflicts & climatic changes.

Effects

- loss of cultural diversity
- loss of biodiversity
- loss of carbon storage capacity
- —11— cultural diversity
- —11— biodiversity
- —11— carbon storage capacity.

Types

① Clear Felling

- Complete destruction of native forest
- Removing non-commercial trees by commercial varieties of trees.

② Selective logging

- only large individual trees (economically beneficial species) are harvested.

③ Mechanised logging

- Heavy machineries are used to pull, lift & transport the trees from the forest.

④ Hang-logging

- Take place in forests that are seasonally flooded or permanetly water logged.
- In such conditions, heavy machinery cannot be used.

⑤ Reduced-impact logging

- Involves careful planning & control of timber harvesting operations to minimize the environmental impact.

* Mining

Defⁿ Mining is the process or operation of excavating economical mineral, coal or other economical material from the earth crust.

Materials excavated from earth crust

① Coal

② Non-metallic minerals - mica, silica, sand, limestone

③ Metallic ores - Iron, copper, bauxite, manganese.

Causes

Across the world, mining contributes to erosion, deforestation, loss of biodiversity, significant use of water resources, damage of rivers, pond water, waste water disposal issues

Impacts

- Pollute air & drinking water
- Harm wildlife & habitat
- Permanently scar natural landscapes

Types

Underground, Open surface (pit), placer, in-situ mining. Underground mines are more expensive & are often used to reach deeper deposits.

Importance

Provides raw materials, minerals & metals critical to our economy.

Advantages

Low cost, reliable electricity, & the materials necessary to build our homes, schools, hospitals, roads, highways, bridges, airports.

* Dams & their effects on forests & tribal people.

Effects

- The dams are responsible for the destruction of forests.
- They are responsible for degradation of catchment areas, loss of flora & fauna, increase of water borne diseases, disturbance in forest ecosystem, resettlement of tribal peoples.

Environmental problems caused by dams

Soil Erosion -
Species extinction
Spread of disease
changes of earth rotation
Sedimentation
Siltation
water logging

Advantages

- Dams can be constructed at any foundation.
- A great amount of water is used for drinking & municipal corporation.

Disadvantage

- It could take more time to construct depending on the type of dam.
- It may lack essential nutrients.

Tribal people

- The locals who are closely associated with the forest habitats & the resources therein in the areas where dams are constructed are the worst affected.
- They gradually loose their traditional habitat & the livelihood which is based on the local resources.
- They depends on the forest for there needs.
- They get distrubed due to the development activities & it is impossible to locate them properly.

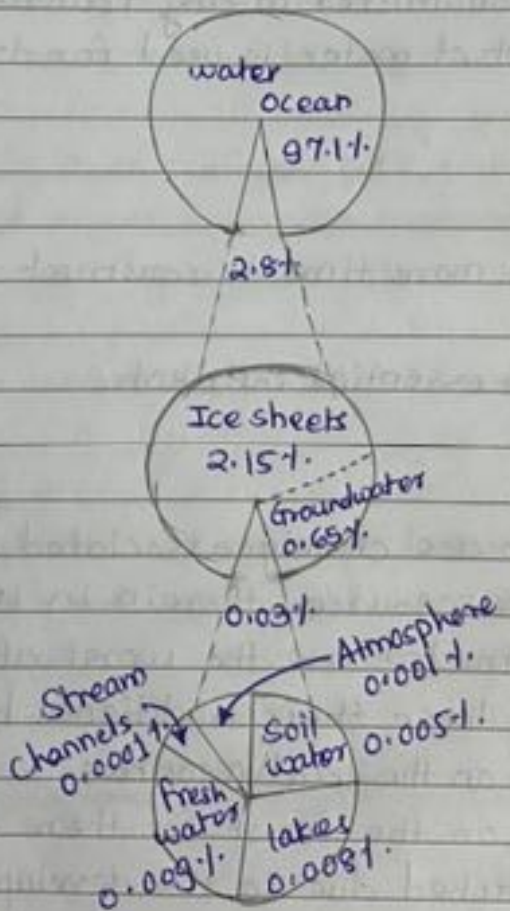
* Water Resources

- water is one of the most essential requirement of life.
- Our earth is called as 'water Planet'.
- About 70% of earth's surface is covered by water.

• But only a small fraction of fresh water is available in the form of surface water/ground water.

Global Distribution of Water

Sr.no.	Distribution	Percentage %
1.	Ocean, Sea	97.1 %
2.	Frozen Ice	2.15 %
3.	Ground water	0.65 %
4.	Surface water	0.03 %



• water resource is not uniformly distributed on earth.
• Now a days, the increased use of water & changing life styles are deteriorating the valuable resource.
• water consumption has increased for domestic,

agricultural & industrial sector.
- Presently, there is overuse of this precious resource.
- The surface water on earth is present in the form of oceans, seas, rivers, streams, lakes, ponds etc.
- This water is used for many purposes.

* Use & over utilization of surface water.
- About 65% of human body is composed of water.
- water is required for various metabolic functions of cell.
- It is used for domestic use, industrial use, agricultural irrigation etc.
- Also for Hydropower generation, water transportation, sewage & effluent discharge.
- The quality of water is decreasing day by day at local, regional & global level.
- For domestic purpose people use the treated water for vehicle washing, flushing, gardening.
- Tap-water is easily available so overuse & wastage of water.
- Industries discharge their toxic effluents in the nearby waterbodies which further leads to many pollution problems.
- Disposal of solid waste containing wooden rags, household refuse, plastics, metal parts, decrease the beauty of water body & lead to spread of waterborne diseases.
- Modern agricultural practices causes bioaccumalation & biomagnification of chemical pesticides & heavy metals during water runoff.
- Overuse of water for irrigational purposes cause the problem of waterlogging in many areas.

* Use & overutilization of Ground water.
- Ground water resources are restricted, site specific & limited.
- Few years ago the groundwater was supposed to be a safe

water source.
- But now a days there is depletion in ground water.
- More & more ground water is consumed for domestic, agricultural & industrial sector.
- Over use of groundwater resulted in the lowering of groundwater table.
- changes in water runoff & infiltration patterns as a result of deforestation are the main reasons of ground water depletion
- Ground water resources built up in large time span but are exhausted in shorter time span.
- Advanced technology must be used to recharge these resources with care & long term management.
- Intensive cropping pattern & increased exploitation of scarce water resources has converted drought areas.

* Mitigation of droughts
- 1/3rd of the world's population directly or indirectly suffer's the effects of drought.

Measures of mitigation
① Increasing the green cover to enhance the water holding capacity of soil.
② Proper planning & management of water resources.
③ mixed agricultural practices.

Effects of drought
① Scarcity of water & disturbance in hydrological cycle.
② Agricultural loss
③ Soil erosion
④ Problems of rehabilitation

* Conflicts over water (वाव्यादरुण संघर्ष)

- Conflict between countries, states or groups over the rights to access water resources.
- Traditionally water has been considered as a common natural resource.
- Now a days due to change in developmental priorities, attitudes of people towards this resource are changed.
- The quantity but quality of available water is responsible for regional or global conflicts.
  e.g Tamilnadu, Karnataka, Satlaj-Yamuna River, Krishna River
- The conflict is occur due to sharing of river water, so needs to be tackled with greater understanding & objectivity.
- It is essential to conserve & use this resources.

* Mineral Resources.

Mineral - A mineral is a naturally occuring substance, representable by a chemical formula, that is usually soild & inorganic, & has a crystal structure.

Types of mineral resources

① Metallic
② Non-metalic

ⓐ Ferrous
ⓑ Non-ferrous

① Metallic Minerals - These metals are hard which conduct electricity & heat with characteristics of lustor or shine.
e.g Silver, chromium, Tin, nickel, copper, Iron, lead, Aluminium, Gold, Zinc

Characteristics of metallic minerals

- metallic minerals shows a metallic shine in their appearance
- the potential source of the metal that can be got through mining
- contains metals in their chemical composition.
- metallic minerals contain metal in raw form.

ⓐ Ferrous metallic minerals
Minerals that contain iron are called ferrous minerals.
e.g chromites, Iron ore & manganese.
ⓑ Non-ferrous metallic minerals
Minerals that do not contain iron are called non-ferrous minerals
e.g lead, silver, gold, copper.
② Non-metallic minerals - There is grouph of chemical elements which when melted do not generate a new product. e.g dimension stone, sand, gypsum, gravel.
characteristics of non-metallic mineral ~~mineral~~
② ~~Non-met~~ - minerals appear with a non-metallic shine or lustre
- do not contain extractable metals in their chemical composition.

Uses of Minerals
- The use of minerals depends upon its deposits.
- The greatest use of minerals depends on its properties.
- For instance, Aluminium is light, strong & durable in nature.
- iron (as steel) in the framework of large building
- clay in bricks & roofing tiles.
- slate for roofing tiles.
- limestone
- clay.
- gypsum in cement.
- gypsum in plaster.
- silica sand in window glass.

Uses of minerals in daily lives
- make Li-Ion batteries.
- Produce commerical electric vehicles.
- Create underwater subsea electrification.
- Power telecommunication devices.

* Exploitation of mineral Resources

- main problem of mineral resources extraction is the liberation of harmful trace elements to the surrounding area.
- the mining & processing of minerals have an important environmental impact on land, water, soil & biological resources as well as social impact.
- the mining activity affects near by water stream.
- Air also polluted due to more transportation & dust from mining activity, power generation & construction.

* Effects of modern agriculture

- Agriculture contributes to a number larger of environmental issues that cause environmental degradation including: climate change, deforestation, biodiversity loss, dead zones, genetic engineering, irrigation problems, pollutants, soil degradation & waste.
- Pollution & degradation of soil, water & air.
- modern systems use large amounts of fossil fuel energy, water, chemical fertilizers & pesticides to produce huge quantities of crop or live stock.
- Desertification, deforestation, soil erosion, salination, climate changes, depletion & pollution of water resources. These factors have resulted in the degradation of land.
- Air pollution, soil compaction, aquifer depletion, the loss of soil organic matter, the water logging & salting of irrigated land are slowing the rise in food outputs.

* Fertilizers - pesticide problems.

- Inorder to increase the fertility of soil as well as production, chemical fertilizers are used in large amounts.
- Organic fertilizers, like compost & vermi-compost have been propagated on a large scale & also proved most efficient, nitrogen fixing,

- when these fertilizers are applied to seed or soil, they enhance availability of nutrients to plants.
- Pesticides are Biocides? that is designed to kill unwanted life.
- The use of hazardous pesticides has resulted in a reduction in the bio-diversely of natural organisms.
- Overuse can contribute to
  soil acidification & soil crust
  reducing the content of organic matter
  altering the pH of the soil

* water logging & salinity
- If there is no proper irrigation provided the water logging is occured.
- water logging occurs when there is too much water in a plant's root zone, which decreases the oxygen available to roots.
- It is a major problem, will cause plant death.
- water logging is associated with another problem-salination
- In regions of scarce rainfall (कमी पाऊस असणारे), the soil contains a large amount of ~~un~~ salts.
- Excessive irrigation brings those salts to the surface. This excessive salt build-up in the soil is called salination.

* Energy Resources
- Agriculture, industry, mining, cooling, transportation, lighting, heating etc needs energy.
- The first problem we face is the explosion in demand. It is due to increase in population.
- Developed countries about 5:1. of the world's population consume 1/4 th of global energy resources.
- An average person consumes 300 GJ of energy per year.

Wind
turbine turn generators, making electricity
Rene
Renew
are in
energy
These
Non-r
time
e.g c
thori
A) * Main
- The
indire
- Ren
wind
- T
- T
like
-
wind
-
of a
- m
- fo
-
of
-
-
apa

classmate
Date
Page 15

Renewable Resources

Renewable resources can be generated continuously in nature & are inexhaustible. e.g. solar energy, wood, wind energy, tidal energy, biomass energy, geothermal energy & hydrogen.
These resources can used again & again in an endless manner.

Non-renewable resources

→ ——— have accumulated in nature over a long span of time & can not be quickly replenished when exhausted.
e.g coal, petroleum, natural gas, nuclear fuels like uranium, thorium.

A) * **Main Renewable Energy Technologies**

- The majority of renewable energy technologies are directly or indirectly powered by the sun.
- Renewable energy flows natural phenomena such as sunlight, wind, tides & geothermal heat.

1. Wind power

- The wind energy is harnessed by making use of wind mills.
- The rotational motion of the blades drives a number of machines like water pumps, electric generators & flour mills.
- A large number of wind mills are installed in clusters called wind farms
- The minimum wind speed required for the satisfactory working of a wind generator is 15 km/hr.
- Modern wind turbines range from 600kW to 5 MW of rated power.
- For commercial use the range is 1.5 to 3 MW.
- The power output of a turbine is a function of the cube of the wind speed.
- As wind speed increases, power output increases dramatically.
- For wind farms the area preferred such as coastal regions, open grasslands, hilly regions.

- wind energy/power is the faster growing among the other renewable energy technologies.
- It is very useful & does not cause & air pollution.
- Wind strengths near the Earth's surface vary.

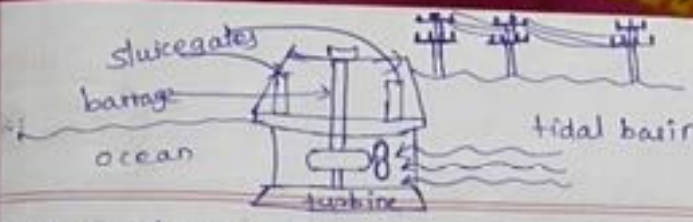
2. Hydropower

Energy in water, in the form of motive energy can be harnessed & used.

- The water flowing in a river is collected by constructing a big dam.
- where the water is stored & allowed to fall from a height to rotate the turbines.
- water is about 800 times denser than air, even a slow flowing stream of water can yield considerable amounts of energy.
- Hydroelectric energy is a term usually for large scale of Hydroelectric dams.
- The micro hydro systems are hydroelectric power installations that produce up to 100 kw of power, for which minimum height of water falls should be 10 meters.

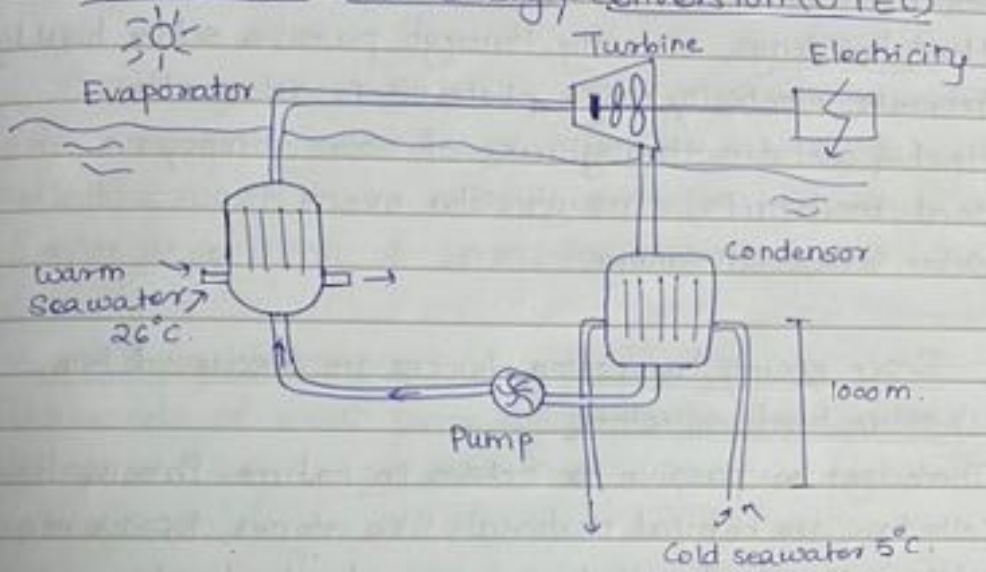
3. Tidal Energy

- This energy harnessed from the tides produced in the ocean
- A difference of several meters is required between height of high tide & low tide to spin the turbines.
- Tidal power captures energy from the tides in a vertical direction.
- Tides come in, raise water levels in a constructed basin & roll out
- with the spin of turbines usually using underwater plant just like a small wind turbine & generate electricity.



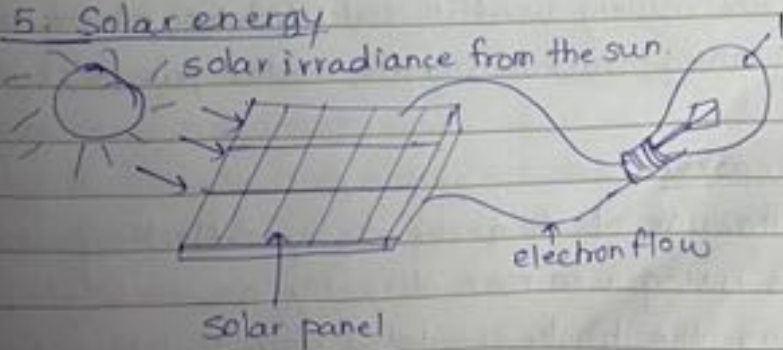
- Around low tide the water in the basin is discharged through a turbine.

4. Ocean thermal energy conversion (OTEC)



- This technique uses the temperature difference between the warmer surface of the ocean & the colder lower regions.
- A difference of 20°C or more is required between surface of water & deeper water of the ocean for the operation of OTEC.
- High vapour pressure is produced by the boiling the liquid like ammonia which is used to rotate the turbine.
- OTEC has not been field tested on a large scale.

5. Solar energy



- Solar energy refers to energy that is collected from sunlight.
- Solar energy can be applied in many ways to.

i) Heat water/air for domestic hot water & space heating needs using solar - thermal panels.
ii) Generate electricity in geosynchronous orbit using solar power satellites.
iii) Heat buildings, directly through passive solar building des
iv) Generate electricity using photovoltaic solar cells.
v) Heat & cool air through use of solar chimneys.
vi) Heat foodstuffs, through solar ovens.
vii) Solar air conditioning.

Solar energy harvesting devices are discussed here.

1) solar heat collectors

These can be passive or active in nature. Passive heat collectors are natural materials like stones, bricks etc. while active heat collectors pump a heat absorbing air or water as medium through a small collector.

2) Solar cells

They are also known as photovoltaic cells / simply PV cells. These are made by using thin semi conductor materials like silicon or gallium. The potential difference produced by a single PV cell of 4 cm^2 size is about 0.4 to 0.5 volts & produces a current of 60 milli amperes.
Solar cells are widely used in calculators, electronic watches, street lightening, traffic signals, water pumps, running radios

3) Solar cooker

It make the use of solar heat by reflecting the solar radiations using a mirror directly on to a glass sheet which covers the black insulated box within which the raw food is kept.
Due to slow heating the food cooked in solar cooker is more nutritious.

4) Solar water heater

It consists of an insulated box painted black from inside with a glass lid to receive & store solar heat. The black painted copper coil heats the water which is stored in storage tank.

5) Solar power plant

Solar energy is harnessed on a large scale by using concave reflectors which cause boiling of water to produce steam. A solar power plant of 50 kW has been installed at Gurgaon, Haryana.

6) Solar furnace

Thousands of small plane mirrors arranged by using concave reflectors. They collect solar heat & produce high temperature up to 3000°C.

6. Liquid biofuel

Liquid biofuel is usually either a biodiesel such as ethanol fuel or bio oil. Biodiesel can be used in modern diesel vehicles with little or no modifications to the engine. It can be made from waste & virgin vegetable & animal oil & fats. Virgin vegetable oil can be used in modified diesel engines. A major benefit of biodiesel is lower emissions. The use of biodiesel reduces emission of carbon monoxide & other hydrocarbons by 20 to 40%.

For ethanol in some areas corn, cornstalks, sugarbeets, sugar cane are grown.

Ethanol liquids are more portable because they have high energy density & can be pumped which makes handling easier.

7. Solid biomass

Biomass is the organic matter produced by the green plants or animals.

Agriculture waste biomass

Crop residues, bagasse, coconut shells, peanut hulls, animal dung, fishery & poultry wastes, cotton stalks are ex. of agriculture waste biomass.

Sugar cane residue usually used directly as a combustible fuel, producing 10 to 20 MJ/kg of heat.

Sources include wood fuel, the biodegradable municipal solid waste or the unused portion of field crops.

wood & its byproducts can now be converted through process such as gasification into biofuels such as woodgas, biogas, methanol or ethanol fuel.

8. Biogas & Anaerobic digestion

Biogas is a mixture of methane, carbon dioxide, hydrogen, hydrogen sulphide. The major & fuel constituent of biogas is methane. It is non polluting, clean & low cost fuel

a) Floating gas holder type

This biogas plant has well shaped digester tank which is placed under the ground & made up of bricks. The digester has partition wall, one of which receives dung, water mixture while other side discharges the slurry. In digester tank, over the dung slurry an inverted steel drum floats to hold the biogas produced. Sometimes gas holder leads to leakage of biogas. The tank has to be painted timely.

b) Fixed dome type biogas plant

It is similar to floating gas holder type biogas. Here instead of steel gas holder there is dome shaped roof made of cement & bricks. It is with only single unit with inlet & outlet chambers.

Biogas can easily be produced from current waste streams such as paper production, sugar production,

sewage, animal waste, municipal waste. These various waste streams are slurried together & allowed naturally to ferment, producing methane gas. This can also be carried out by converting current sewage plants into biogas plants. The sludge that remains behind after the biogas production can be used as a better fertilizer than the original biomass.

9. Geothermal energy

Geothermal energy is obtained by tapping the heat from interior of the earth, usually from kilometers deep into the earth's crust.

Three types of power plants are used to generate power from geothermal energy.

1. Dry steam plants 2. Flash steam plants 3. Binary plants.

- Dry steam plants take steam out of fractures in the ground & use it directly to drive a turbine that spins a generator.
- Flash plants take hot water, usually at temperatures over 200°C, below the ground & allow it to boil as it rises to the surface & then runs the steam turbine.
- Binary plants, the hot water flows through heat exchangers, boiling an organic fluid that spins the turbine.

10. Hydrogen

Due to high energy content hydrogen can serve as a excellent fuel. It contains 150 kJ/g of energy.

It is produced by

a) Thermal dissociation of water at 3000 K.

b) Thermochemically, hydrogen is produced by chemical reaction of water with some other chemicals.

c) Electrolytic method dissociates water into hydroge & oxygen. At present hydrogen is used in the form of liquid hydrogen as a fuel in spaceship.

B) Non renewable resources

A non renewable resource is a natural resource that cannot be re-made, regrown or regenerated on a scale comparative to its consumption. It exists in a fixed amount in nature.

1. Coal

- Coal is a fossil fuel or fuel that comes from the remains of prehistoric plants or animals.
- The formation of coal occurs over millions of years via a process known as carbonation.
- In this process, dead vegetation is converted into carbon-rich coal under very high temperature & pressure.
- Coal is a readily combustible black or brownish rock.
- It is a sedimentary type of rock.
- It is composed primarily of carbon.
- It is the largest single source of fuel for the generation of electricity & also largest source of carbon dioxide emissions.
- India has about 5% of the world's coal & India coal is not very good in terms of heat value.
- There are mainly four types of coal peat, lignite, bituminous & anthracite.
- Anthracite is with the highest calorific value & is primarily used for residential & commercial space heating.
- Environmental effects of coal mining & burning includes release of carbon dioxide & methane.
- Interference with groundwater & water table levels dust nuisance, wastes which contains uranium, thorium & other heavy metals.

2. Petroleum

- It is a naturally occurring, flammable liquid.
- It is found in porous rock formations in the upper strata of earth crust.

- It is contains complex mixture of hydrocarbons of various molecular weights with other organic compounds.
- The hydrocarbons in crude oil are mostly alkanes, cycloalkanes & various aromatic hydrocarbons.
- It has to be purified & refined by the process of fractional distillation.
- It is usually black or dark brown.
- Petroleum is used mostly to produce fuel oil & gasoline.

Liquefied Petroleum gas - the main component of it is butane, the other is propane & ethane. Due to its high energy density & easy transportability it has become the world's most important source of energy. It is odourless, but the domestic gas cylinders give a foul smell a ethyl ~~ene~~ mercaptan is added to LPG so that leakage can be detected.

3. Natural Gas

- It is a gaseous fossil fuel primarily consists of methane (95%) along with ethane, propane, butane & pentane.
- It is the cleanest fossil fuel.

(a) Compressed Natural Gas (CNG)

- It is considered to be an environmentally 'clean' alternative to other polluting fuels & much safer than others.
- It is made by compressing natural gas.
- It is stored & distributed in hard containers usually in cylindrical or spherical shapes to maintain equal pressure on the walls of the containers.

(b) Synthetic Natural Gas.

- It is a liquid fuel obtained from coal & natural gas.
- It is a mixture of carbon monoxide & hydrogen.
- Low grade coal is initially transformed into synthetic gas by catalytic conversion to methane.

4. Nuclear Energy

- It is obtained by the splitting or fusing the nuclei of atoms.
- $E = mc^2$ E = energy release m = mass c = speed of light in a vaccum.
- Nuclear energy is released by the exothermic process.

@ Nuclear fission

- It is the splitting of the nucleus of an atom into parts often produces free neutrons & other smaller nuclei, which again produce photons.
- Fission releases tremendous amount of energy.

ⓑ Nuclear fusion

- It occurs between two isotopes of a lighter element which forced together at extremely high temperature.
- Until they fuse to form a heavier nucleus releasing enormous energy.

* Land Resources

- The most important land resource upon which all human activity is based is land.
- It is largely covered with natural forest, grasslands, wetland, agricultural land & urban & rural settlements.
- The fertile surface layer of earth capable of supporting plant life is called as soil.
- Soil is most important resource.

Soil erosion

- The removal of top soil from it's place by various agencies like wind, water etc is called soil erosion.
- The presence of plant cover significantly reduces soil erosion.

There are 4 types of soil erosion

(1) Wind erosion – Soil erosion due to wind is very common in dry region.

- Where soil is chiefly sandy & the vegetation is very poor,

② Sheet erosion - It is wide spread of soil.
- It is common in rainy season.
- It is seen in the heavy quantity of silt that deposits.

③ Rill erosion - Removal of soil by running water.
- The erosion found in semihumid region of the world.

④ Gully erosion - It takes place when storming rains produce.

* Soil conservation

Principles of soil conservation

1. Protection of soil from impact of rain drops.
2. To slow down the water from concentrating & moving down the slop in a narrow path
3. To slow down the water movement, when it flows along the slope.
4. To increase the size of soil particle
5. Reduction in the wind velocity near the ground.
6. To grow the strips of stubble or other vegetation cover.

* Key priorities necessary to sustain human progress into the distant future.

1. Achieve population control.
2. Decrease poverty inequality & debts in developing countries.
3. Develop sustainable agriculture.
4. Protect the genetic diversity
5. Protect ocean & coastal resources
6. Protect fresh water quality & improve water efficiency.
7. Improve energy efficiency
8. Develop renewable energy resources.
9. Control greenhouse gases & other air pollutants
10. Protect the stratospheric ozone layer.
11. Minimise wastes.
12. Reduce military spending, so that money can be diverted to funding sustainable development.