ENVIRONMENT & ECOLOGY
BAS104/204
UNIT-2
POWERPOINT PRESENTATION

BY: Mr. ANUPAM RATN,
ASTT. PROFESSOR,
APPLIED SCIENCE DEPT.

BAS104 / BAS204: ENVIRONMENT AND ECOLOGY SYLLABUS

Unit-2

Natural Resources: Introduction, Classification.

Water Resources; Availability, sources and Quality Aspects, Water Borne and Water Induced Diseases, Fluoride and Arsenic Problems in Drinking Water.

Mineral Resources; Material Cycles; Carbon, Nitrogen and Sulfur cycles.

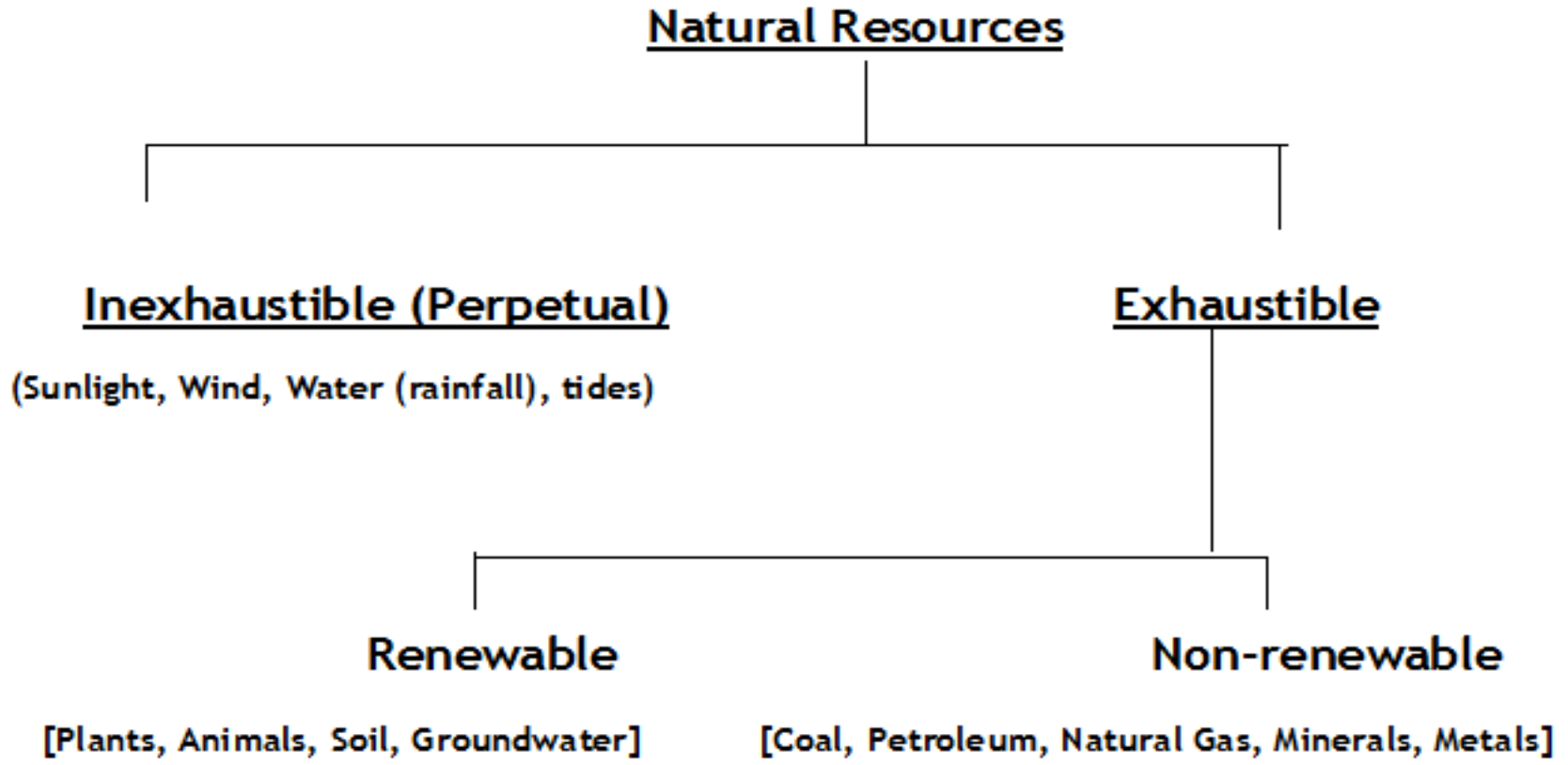
Energy Resources; Conventional and Non conventional Sources of Energy.

Forest Resources; Availability, Depletion of Forests, Environment impact of forest depletion on society.

LECTURE-10: INTRODUCTION AND CLASSIFICATION OF NATURAL RESOURCES

The resources which have been provided by the nature for the survival of living beings are known as natural resources.

For ex: Air, water, soil, sunlight, plants (forests), animals, minerals, metals, fossil fuels, nuclear fuels etc.



LECTURE-10: INTRODUCTION AND CLASSIFICATION OF NATURAL RESOURCES……

INEXHAUSTIBLE RESOURCES OR PERPETUAL RESOURCES:

These resources are unlimited or unending and are not likely to be exhausted (=finished) by human activities. These resources naturally perpetuate (=continuously forming) themselves. Human activities can alter (=change) the quality of these resources but not their quantity. For example: Sunlight, wind, water (rainfall), tides etc.

EXHAUSTIBLE RESOURCES:

These resources are limited. Both quantity and quality of these resources can be altered by human activities. These resources are of two types-

- **RENEWABLE RESOURCES:**

The resources which can be renewed (=regenerated=recycled) by nature or human activities after a time interval are known as renewable resources.
For ex: Plants (forests), animals, soil, and groundwater etc.

- **NON-RENEWABLE RESOURCES:**

These resources are formed in nature over millions of years and which once exhausted, can not be recycled or regenerated in short time.
For ex: Fossil fuels (Coal, Petroleum, and natural gas), minerals, metals and nuclear fuels etc.

VARIOUS FACTORS RESPONSIBLE FOR DEPLETION/DESTRUCTION OF NATURAL RESOURCES ????

- **Population Growth (Over Population):**
- **Uneven (unequal) distribution of Resources:**
- **Technological And Industrial Development:**

  For technological and industrial development we need three things-

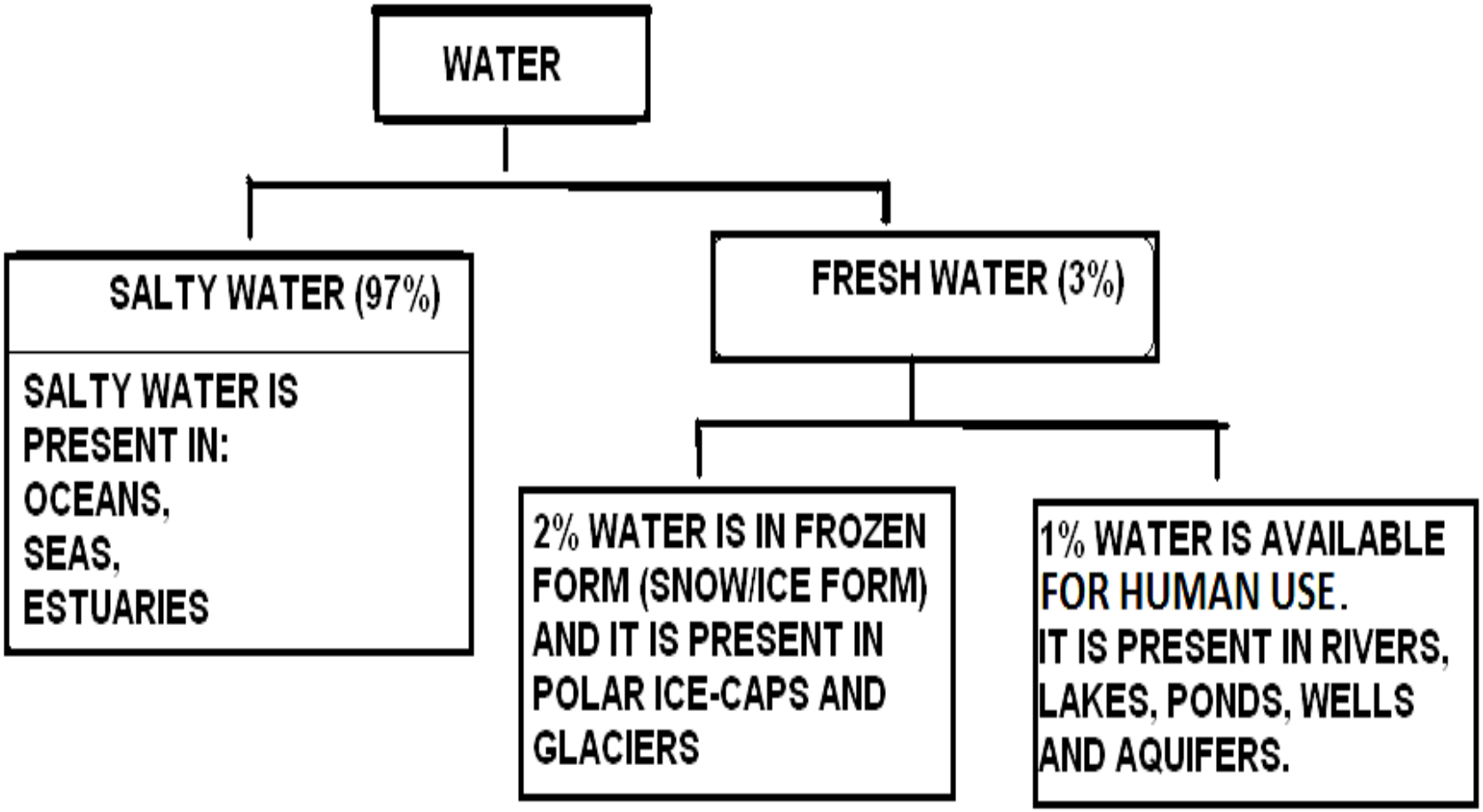
  - **A huge area of land**
  - **Huge consumption of water**
  - **Huge amount of energy**

- **Overuse and Irrational use of Natural Resources:**

THE IMPACTS OF RESOURCE DEPLETION ON ENVIRONMENT?

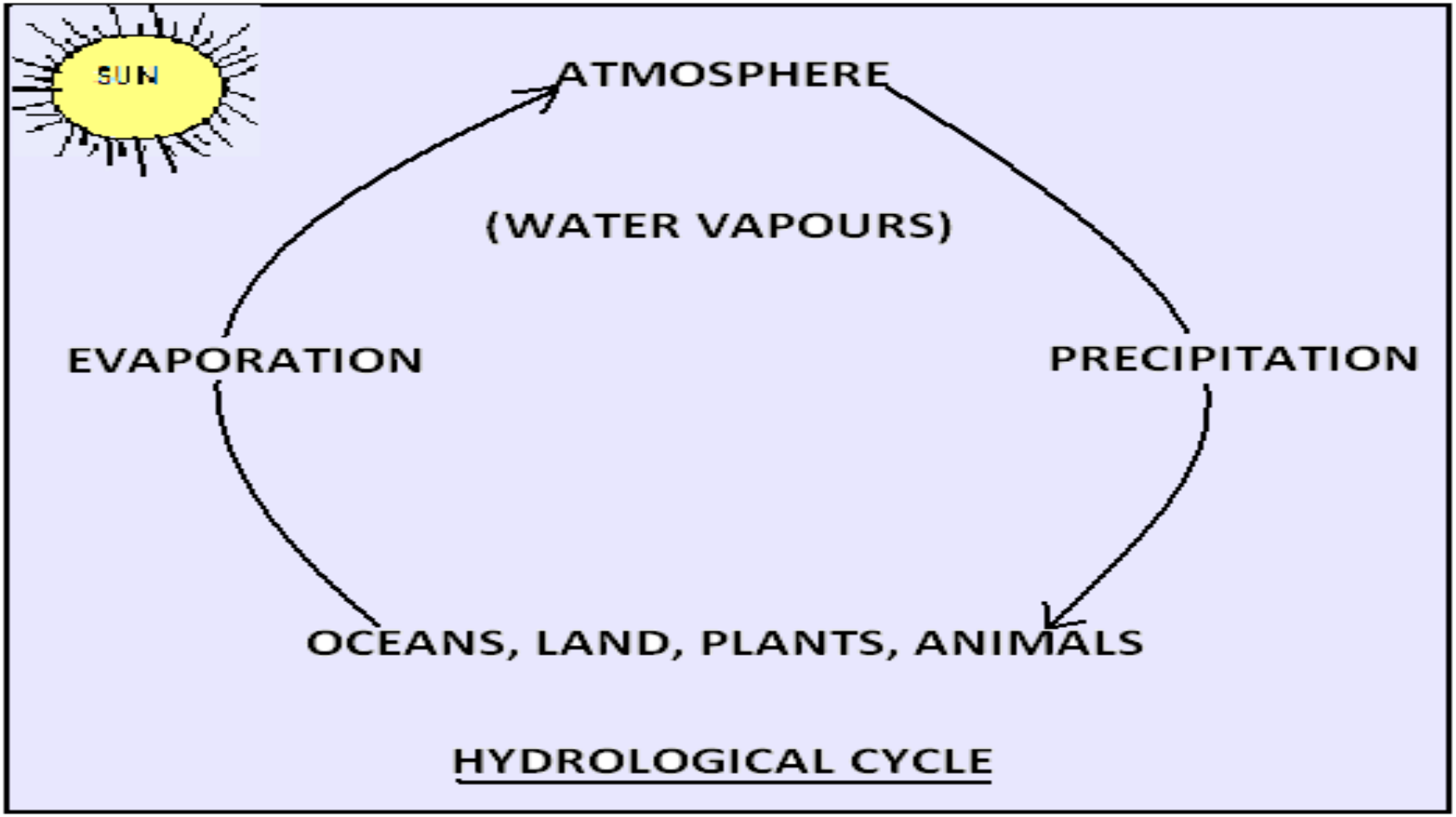
- Ecological imbalance (i.e., imbalance in nature)
- Environmental Pollution
- Shortage of materials (such as metals, minerals, coal, oil etc.)
- Struggle for existence (Competition, fight, war etc.)
- Starvation (=death due to hunger)
- Slackening (= to slow down) of economic growth of a Nation

LECTURE-11: WATER RESOURCES (DISTRIBUTION, SOURCES & QUALITY ASPECTS)



WATER CYCLE = HYDROLOGICAL CYCLE

"The movement of water from land to ocean, from ocean to atmosphere and from atmosphere back to land is called hydrological cycle or water cycle".



CORE CAUSES OF WATER CRISIS IN THE WORLD:

- **Increasing population: More population put more demand of water for various purposes------**
  - Increasing demand of water for domestic purpose
  - Increasing demand of water for irrigation purpose
  - Increasing demand of water for industrial purposes
- **Pollution of surface and ground water by human beings:**
- **Sedimentation in ground water:**

CONSERVATION AND MANAGEMENT OF WATER RESOURCE:

- Reduction in consumption of water:-

  -in domestic activities

  -in agricultural activities

  -in industrial activities

- Rainwater harvesting technique
- Watershed management
- Development of appropriate technology:
  - *Development of technology for treatment of waste water treatment.*

WATER QUALITY STANDARDS

Drinking Water Standards (Source-BIS for drinking water)

S. NO.	SUBSTANCES OR CHARACTERSTICS	REQUIREMENT DESIRABLE LIMIT	PERMISSIBLE LIMIT (In absence of alternate source)
	PHYSICAL CHARACTERSTICS		
1	Colour maximum (Hazen unit)	5	25
2	Odour	Unobjectionable	---
3	Taste	Agreeable	---
4	Turbidity maximum (NTU)	5	10
	CHEMICAL CHARACTERSTICS		
5	pH value	6.5 to 8.5	No relaxation
6	Alkalinity (as $CaCO_3$), mg/l, max	200	600
7	Total hardness (as $CaCO_3$), mg/l, max	300	600
8	Chlorides (as Cl), mg/l, max	250	1000
9	Calcium (as Ca), mg/l, max	75	200
10	Magnesium (as Mg), mg/l, max	30	100
11	Sulphate (as SO_4), mg/l, max	200	400
12	Dissolved solids , mg/l, max	500	2000
13	Residual chlorine (as Cl_2), , mg/l, max	0.2	---
14	Iron (as Fe), , mg/l, max	0.3	---
	BIOLOGICAL CHARACTERSTICS		
15	Total Coliform (MPN/100 ml of water)	3 (WHO)	10 (BIS)

LECTURE-12: WATER BORNE & WATER INDUCED DISEASES, ARSENIC & FLUORIDE PROBLEM IN DRINKING WATER

WATER BORNE DISEASES

DISEASE	CAUSE (PATHOGEN)	SYMPTOMS
Cholera	*Vibrio cholera*	Vomiting and thirst, pain and tiredness, dehydration
Typhoid	*Salmonella typhi*	Prolonged continuous fever, headache, red spots on abdomen and chest
Diarrhoea	*E.coli*	Dehydration, many times loose motion, weakness
Dysentery	*Entamoeba histolytica*	Dehydration, many times watery stool (watery loose motion) with or without blood and mucus
Jaundice	*Hepatitis virus A, B, E*	Tiredness, abdominal pain, fever, weakness
Polio	*Poliovirus*	Permanent paralysis of limbs(legs)

LECTURE-12: WATER BORNE & WATER INDUCED DISEASES, ARSENIC & FLUORIDE PROBLEM IN DRINKING WATER……

WATER INDUCED DISEASES

DISEASE	CAUSE (CHEMICAL)	SYMPTOMS
Blue-baby syndrome (Methaemoglobinemia)	Nitrate in ground water	BLUE COLOUR OF BODY OF NEW BORN BABIES
Cancer & paralysis	Pesticides (DDT, BHC), heavy metals	---------
Arsenicosis or Black Foot Disease	Arsenic	DEVELOPMENT OF BLACK SPOTS ON CHEST AND LIMBS
Fluorosis	Fluoride	DEFORMITY OF TEETH AND BONES
Minamata	Mercury (Hg)	SKIN HARDENING, PARALYSIS, PREGNANT LADIES GAVE BIRTH TO UNDER-DEVELOPED BABIES
Itai-itai disease or *ouch-ouch* disease	Cadmium (Cd)	SWELLING & PAIN IN MUSCLES AND JOINTS

LECTURE-12: WATER BORNE & WATER INDUCED DISEASES, ARSENIC & FLUORIDE PROBLEM IN DRINKING WATER……

ARSENIC PROBLEM IN DRINKING WATER

Arsenic causes Arsenicosis or Black foot disease. This is a skin disease caused by drinking arsenic polluted ground water. The main source of Arsenic in ground water is the sedimentary rocks which are rich in Arsenic.

Symptoms: The patient develops black spots on chest, back, limbs (hands and legs). The skin becomes hard and fibrous. Severe toxicity can lead to gangrene and skin cancer.

Several cases of Arsenicosis have been reported from *West Bengal and Bihar (India)*.

Bangladesh has some of the most polluted ground water in the world. Around 85% of the area of the country has arsenic contaminated ground water and about 1.2 million people of Bangladesh (Bangladeshis) have been suffering from arsenic poisoning.

LECTURE-12: WATER BORNE & WATER INDUCED DISEASES, ARSENIC & FLUORIDE PROBLEM IN DRINKING WATER……

FLUORIDE PROBLEM IN DRINKING WATER

The excess intake of fluoride (higher than the optimum level) in drinking water leads to Fluorosis disease, which results in deformity of teeth and bones. The main source of fluoride in ground water is the rocks which are rich in fluoride.

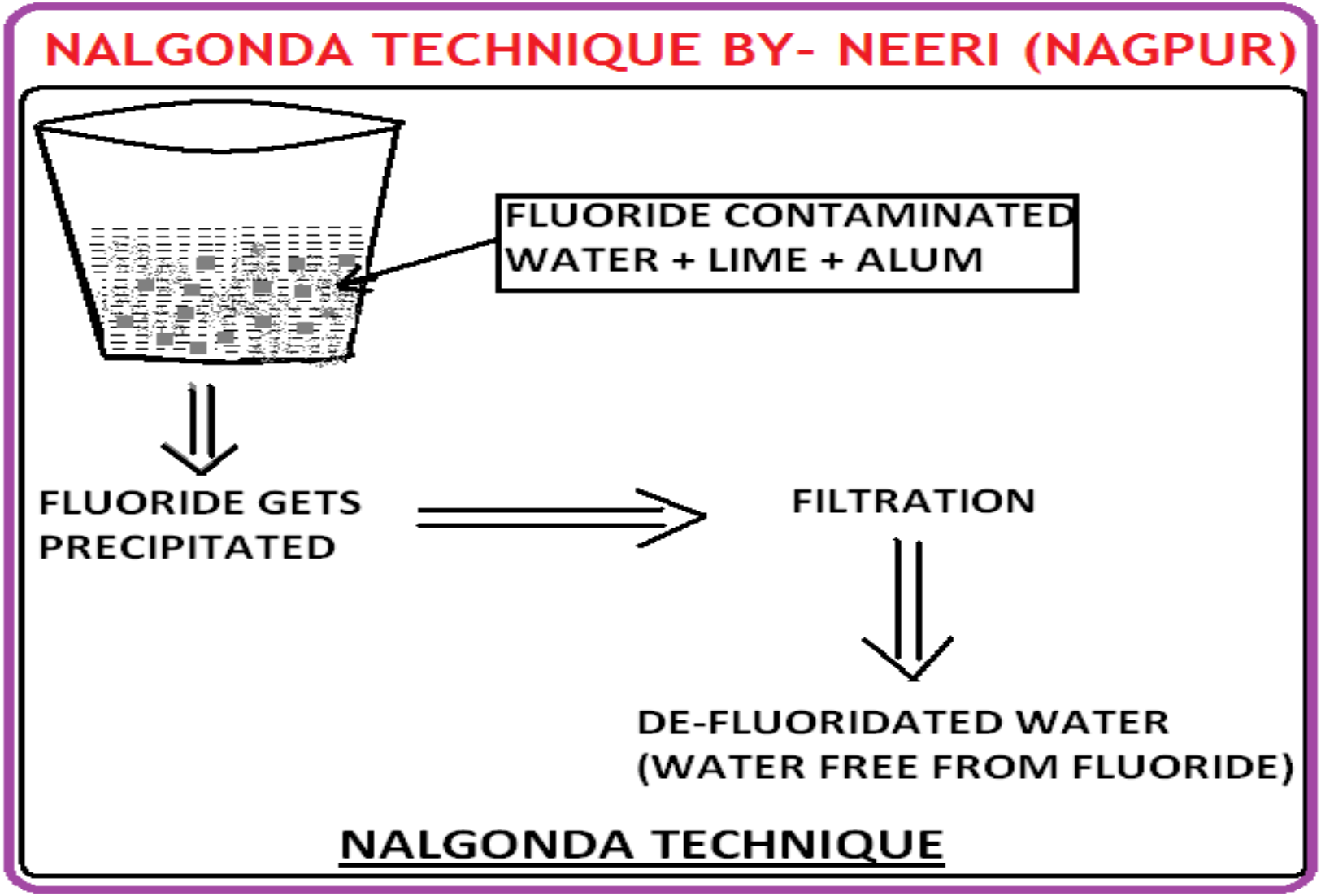
Fluorosis is an endemic disease. Fluorosis may be-

(i) Dental Fluorosis: Deformity of teeth

(ii) Skeletal Fluorosis: Deformity of bones. Skeletal fluorosis is also called *knock-knee disease*.

The available data suggest that 19 States in India (including Rajasthan, Andhra Pradesh and Bihar) are endemic for fluorosis (fluoride level in drinking water >1.5 mg/l), and about bout 62 million people in India suffer from dental and skeletal fluorosis.

LECTURE-12: WATER BORNE & WATER INDUCED DISEASES, ARSENIC & FLUORIDE PROBLEM IN DRINKING WATER……



MINAMATA DISEASE

MINAMATA DISEASE:-

Place: Japan

Source: Minamata bay (Japan) in which a plastic factory discharged an estimated 200-600 tones of mercury (Hg) over a period of 36 years.

- **Normally mercury is found in 3 forms: Elemental, Inorganic and Organic Form. Out of these 3 forms, *Organic mercury is very toxic in nature.***
- **The methyl mercury through food chain entered in to the body of fish. When mercury contaminated fish were eaten by human beings it caused mercury poisoning in them, which was called Minamata disease. *It was a kind of Mercury Biomagnification.***

Result:

- ***The pregnant ladies gave birth to deformed (underdeveloped) babies.***
- ***Paralysis and other neurological disorders in people.***
- ***By the year 1992, more than 2209 victims (infected persons) identified and out of these 1403 died.***

BLUE BABY SYNDROME

"Blue baby syndrome" (Methaemoglobinemia disease)

- It is believed to be caused by high nitrate contamination in ground water. Excess fertilizers (nitrogenous fertilizers) may reach the underground water by leaching due to which ground water gets contaminated with nitrate. Nitrate contaminated ground water is used by human beings for drinking.

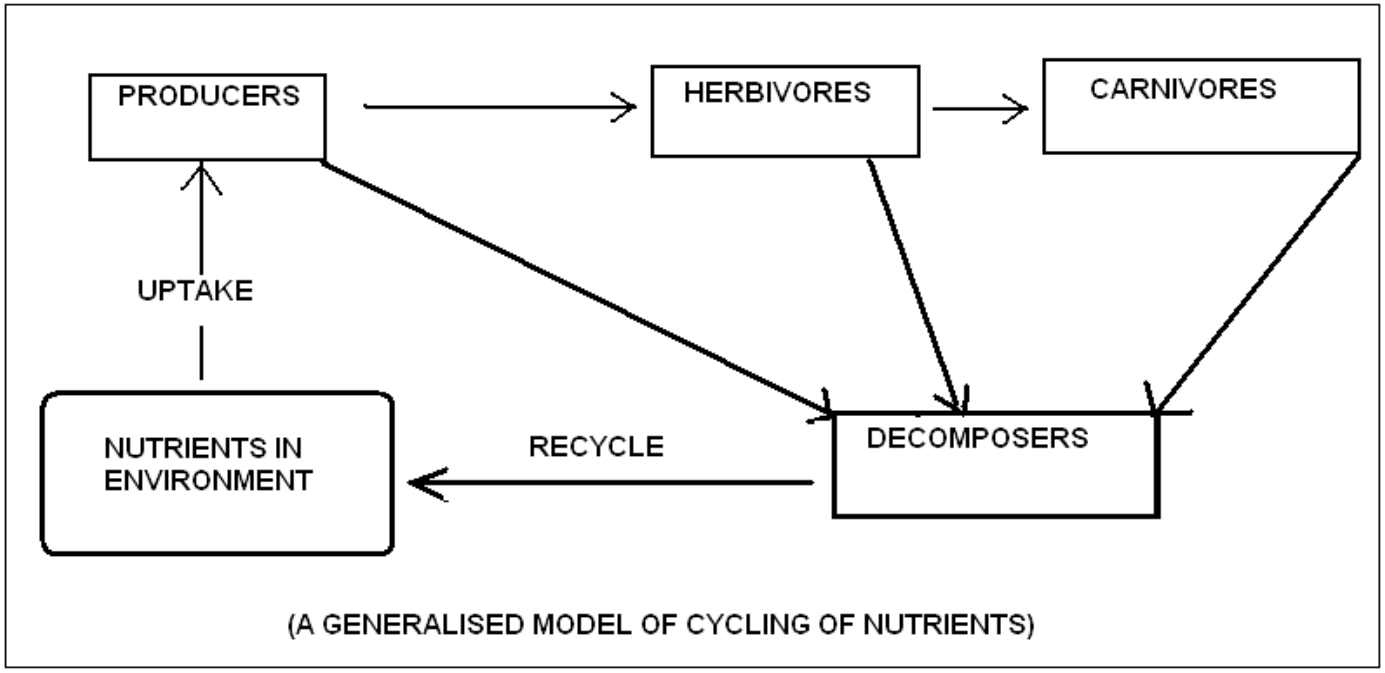
- In our body nitrate reacts with haemoglobin of blood to form methaemoglobin which stops the oxygen supply to the body parts (especially brain) leading to death. This disease is also known as blue baby syndrome because babies are born blue in colour and die soon.

LECTURE-13: MATERIAL OR BIO-GEOCHEMICAL CYCLES, CARBON, NITROGEN AND SULPHUR CYCLES

BIO-GEOCHEMICAL CYCLE (NUTRIENT CYCLE):

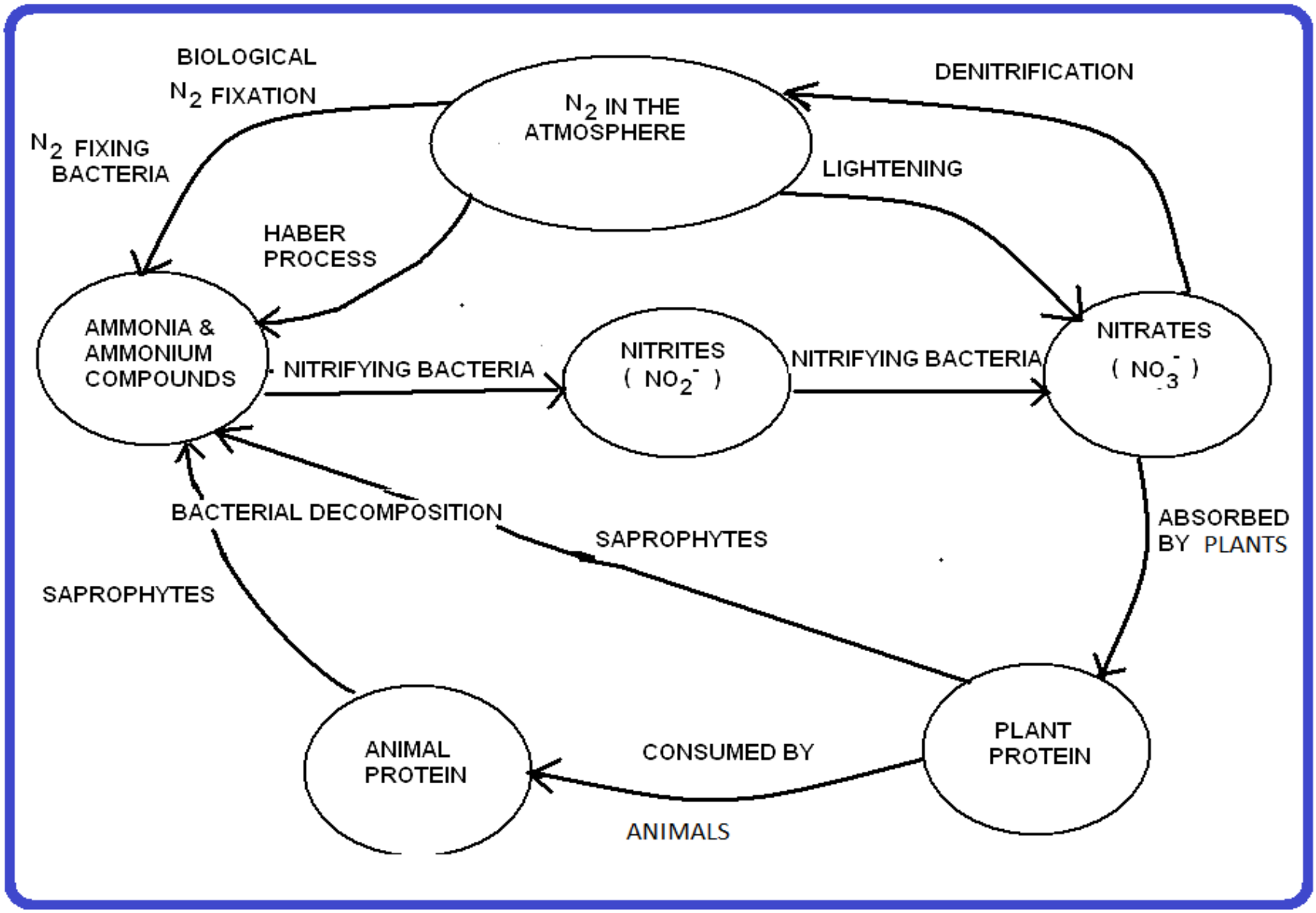
The circulation of nutrients between living and non-living components of environment is known as biogeochemical cycle.

The flow (=circulation) of material (=nutrients) is bi-directional or cyclic. *Such cycles may be: Carbon cycle, Hydrogen cycle (H_2O cycle), Nitrogen cycle, Sulphur cycle, Phosphorus cycle etc.*



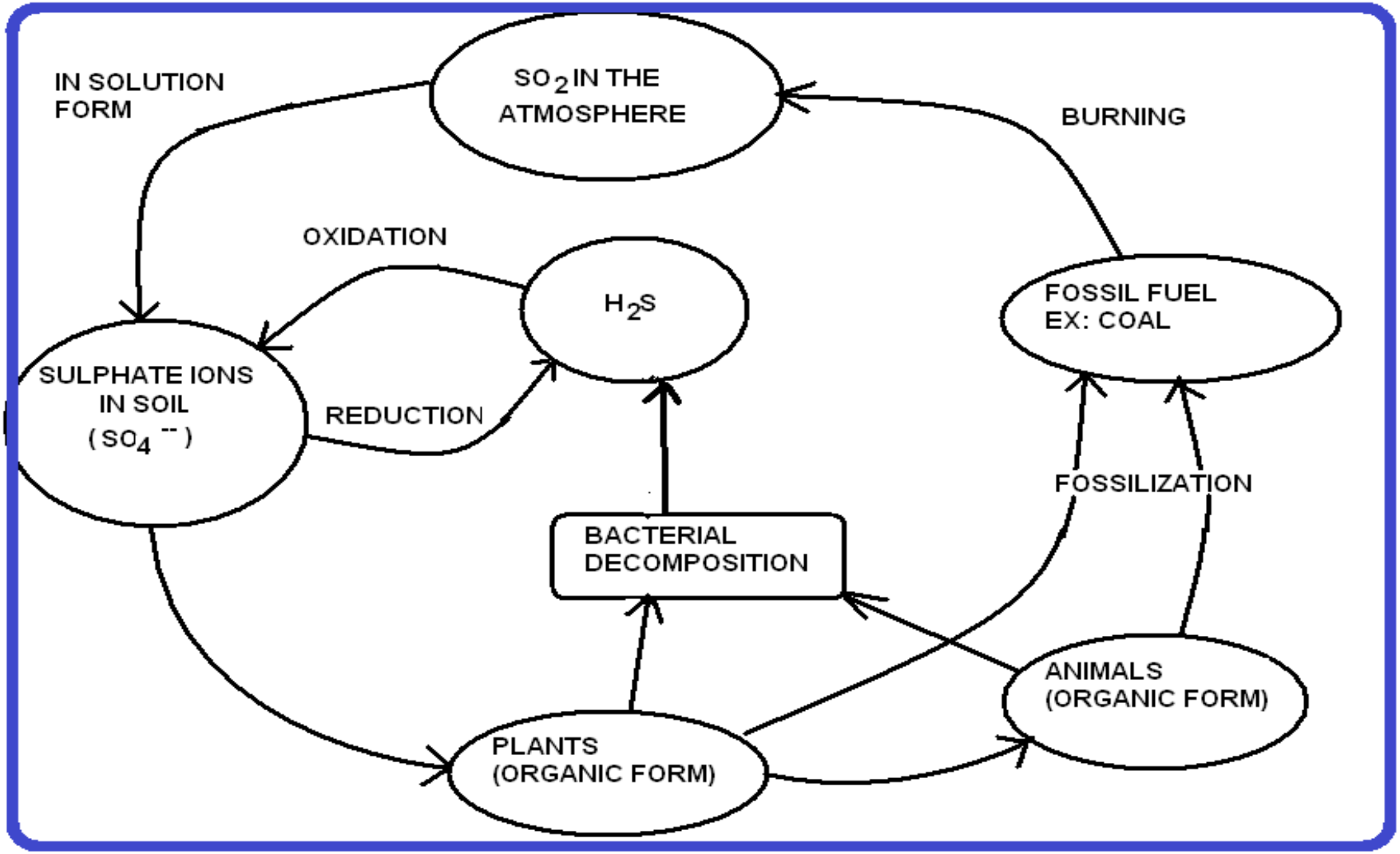
(A GENERALISED MODEL OF CYCLING OF NUTRIENTS)

NITROGEN CYCLE: IT COMPLETES IN 5 STEPS NAMELY: NITROGEN FIXATION, NITRIFICATION, DENITRIFICATION, NITROGEN ASSIMILATION AND AMMONIFICATION



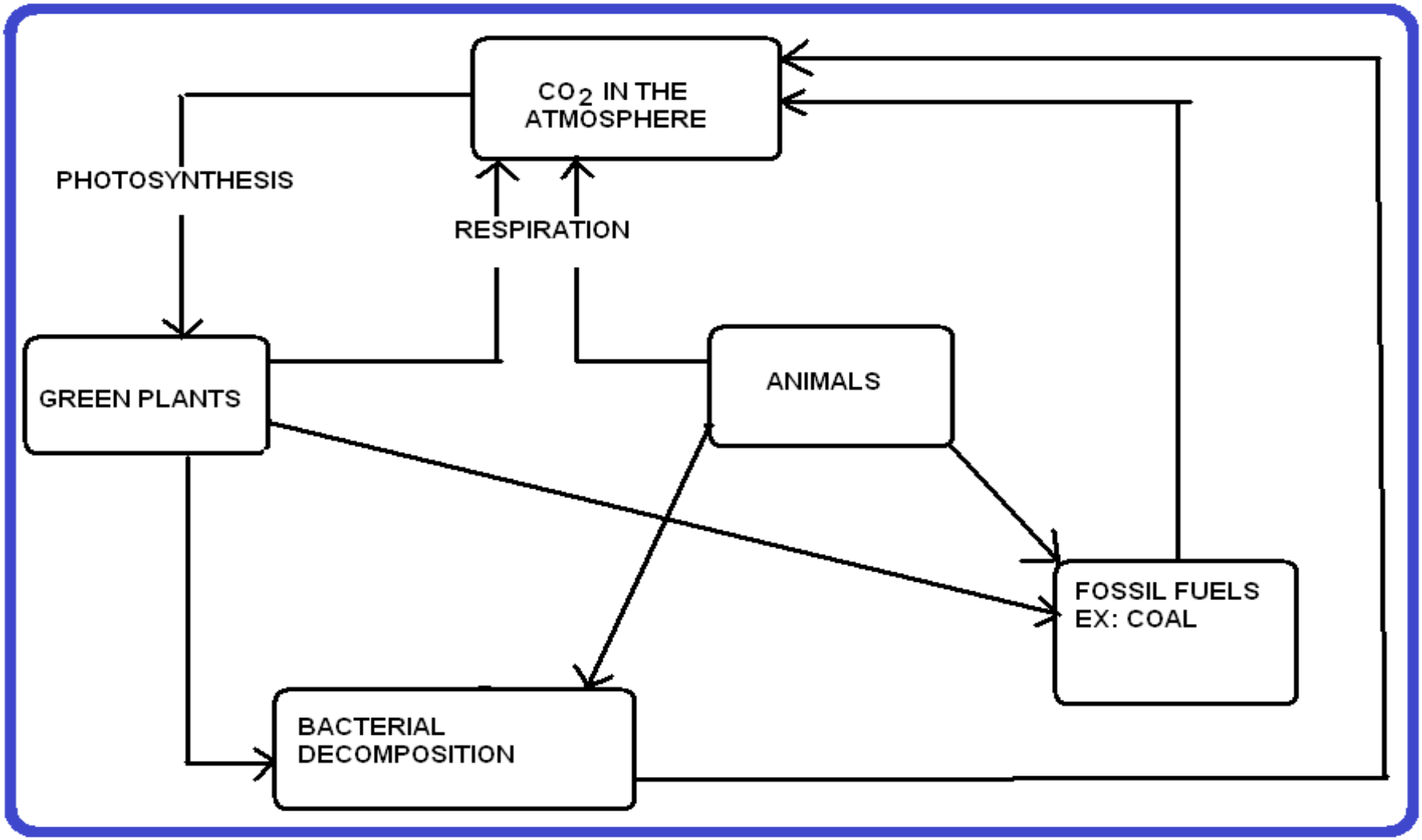
SULPHUR CYCLE:

The circulation of SULPHUR between living and non-living components of environment/ecosystem is known as SULPHUR cycle.



CARBON CYCLE = CARBON-DI-OXIDE CYCLE:

The circulation of CARBON between living and non-living components of environment/ecosystem is known as CARBON cycle.



LECTURE-14: ENERGY RESOURCES: CONVENTIONAL SOURCES OF ENERGY- FOSSIL FUELS (COAL, PETROLEUM & NATURAL GAS), NUCLEAR FUELS

RENEWABLE SOURCES OF ENERGY

(=NON-CONVENTIONAL ENERGY SOURCE)

- They can be renewed or recycled or regenerated in short period of time.
- *They are also called* Non-conventional energy source
- They are also called Alternative energy resources.
- They are eco-friendly and people friendly energy resources.

For ex: Solar energy, Wind energy, Hydro-energy (hydel energy), Geothermal energy, Biomass energy, tidal energy.

LECTURE-14: ENERGY RESOURCES: CONVENTIONAL SOURCES OF ENERGY- FOSSIL FUELS (COAL, PETROLEUM & NATURAL GAS), NUCLEAR FUELS……..

NON-RENEWABLE SOURCES OF ENERGY

(= CONVENTIONAL ENERGY SOURCE):

- They are present in limited amount and are *exhaustible* (= they can be finished).
- Once they get finished, they can not be renewed or recycled or regenerated in a short period of time.
- *They are also called Conventional sources of energy.*
- *They cause environmental pollution.*

For ex: Fossil fuels (for ex: Coal, Petroleum, Natural gas), Nuclear fuels (for ex: Uranium, Thorium, Plutonium etc.)

LECTURE-14: ENERGY RESOURCES: CONVENTIONAL SOURCES OF ENERGY- FOSSIL FUELS (COAL, PETROLEUM & NATURAL GAS), NUCLEAR FUELS……..

FOSSIL FUELS: The fuels which are preserved under the earth's crust as the remains of plants and animals are called fossil fuels.

For ex: Coal, petroleum and natural gas.

COAL (=BLACK GOLD):

Coal is a complex mixture of carbon, hydrogen and oxygen.

- Small amount of nitrogen and sulphur also occurs in coal.
- It is found in deep coal mines under the surface of earth.
- Coal is mainly burnt in thermal power stations to produce electricity.

DISADVANTAGES (LIMITATIONS):

Environmental pollution: Burning of coal releases gases such as CO, CO_2, SO_2, NO_2 etc, which are a major cause of air pollution

LECTURE-14: ENERGY RESOURCES: CONVENTIONAL SOURCES OF ENERGY- FOSSIL FUELS (COAL, PETROLEUM & NATURAL GAS), NUCLEAR FUELS……..

Petroleum (crude oil) —Fractional distillation→ Petrol (Gasoline), Diesel, Kerosene, Lubricants, Furnace Oil, Petroleum Gas, Wax, Coke, Naphtha etc.

Disadvantages (limitations):

Environmental pollution:

- The various pollutants produced by burning of petrol in automobiles include- carbon monoxide, un-burnt hydrocarbons, oxides of nitrogen (NO, NO_2) and lead compounds etc.
- Carbon monoxide is a poisonous gas which causes respiratory problems in human beings.
- NO_2 is very corrosive and attacks skin. NO_2 is also responsible for acid rain formation.

LECTURE-14: ENERGY RESOURCES: CONVENTIONAL SOURCES OF ENERGY- FOSSIL FUELS (COAL, PETROLEUM & NATURAL GAS), NUCLEAR FUELS……..

NUCLEAR ENERGY (NUCLEAR FUELS)

Nuclear energy can be generated by 2 types of reactions -

1. Nuclear fission:

The process by which a heavy unstable nucleus (such as u-235) is broken down in to two medium weight nuclei by the bombardment of a slow neutron so as to liberate more neutrons and a lot of energy (Nuclear energy).

$$_{92}U^{235} + {}_{0}n^{1} \rightarrow {}_{36}Kr^{92} + {}_{56}Ba^{141} + 3{}_{0}n^{1} + \text{ENERGY}$$

2. Nuclear fusion:

It is a nuclear reaction in which two light nuclei (such as isotopes of hydrogen: deuterium) combine to form a heavier nucleus (such as helium) and release enormous energy (nuclear energy).

$$_{1}H^{2} + {}_{1}H^{2} \rightarrow {}_{2}He^{3} + {}_{0}n^{1} + \text{ENORMOUS ENERGY}$$

LECTURE-14: ENERGY RESOURCES: CONVENTIONAL SOURCES OF ENERGY- FOSSIL FUELS (COAL, PETROLEUM & NATURAL GAS), NUCLEAR FUELS……..

NUCLEAR ENERGY (NUCLEAR FUELS)

ADVANTAGES OF NUCLEAR ENERGY:

- Small quantity of nuclear fuel produces huge amount of energy
- While all the fossil fuels reserves are decreasing, nuclear energy provides a source of limitless energy

DISADVANTAGES OF NUCLEAR ENERGY:

- Nuclear power plants emit radioactive substances which cause radiation pollution.
- People working in nuclear power plants suffer from various health disorders.
- Leakage from nuclear plants can lead to accident (disaster).

LECTURE-15: NON CONVENTIONAL SOURCES OF ENERGY: *SOLAR, WIND, HYDRO, TIDAL, GEOTHERMAL, BIOMASS & HYDROGEN* (AS FUTURE SOURCE OF ENERGY)

SOLAR ENERGY

SOLAR ENERGY: The energy radiated out by the sun in the form of *electromagnetic waves* is called solar energy. Sun is almost inexhaustible source of energy.

Harnessing (utilization) of Solar energy:

(A) Solar energy $\longrightarrow$ Electrical energy

[For ex: Solar cell (photovoltaic cell), Solar panel, solar water pump etc.]

(B) Solar energy $\longrightarrow$ Heat energy by magnifying its effect

[For ex: devices like Solar cooker, Solar water heater, passive Solar house, Solar furnace, Solar evaporation (desalination), Solar distillation, etc.]

(C) Solar energy $\xrightarrow{\textit{Green plants}}$ Chemical energy or food energy

[For ex: Photosynthesis process]

LECTURE-15: NON CONVENTIONAL SOURCES OF ENERGY: *SOLAR*, *WIND*, *HYDRO*, *TIDAL*, *GEOTHERMAL*, *BIOMASS* & *HYDROGEN* (AS FUTURE SOURCE OF ENERGY)

ADVANTAGES (MERITS) OF SOLAR ENERGY:

- ✓Inexhaustible
- ✓Pollution free
- ✓Eco-friendly
- ✓People friendly
- ✓Used for generation of electricity in space satellites
- ✓Cost effective

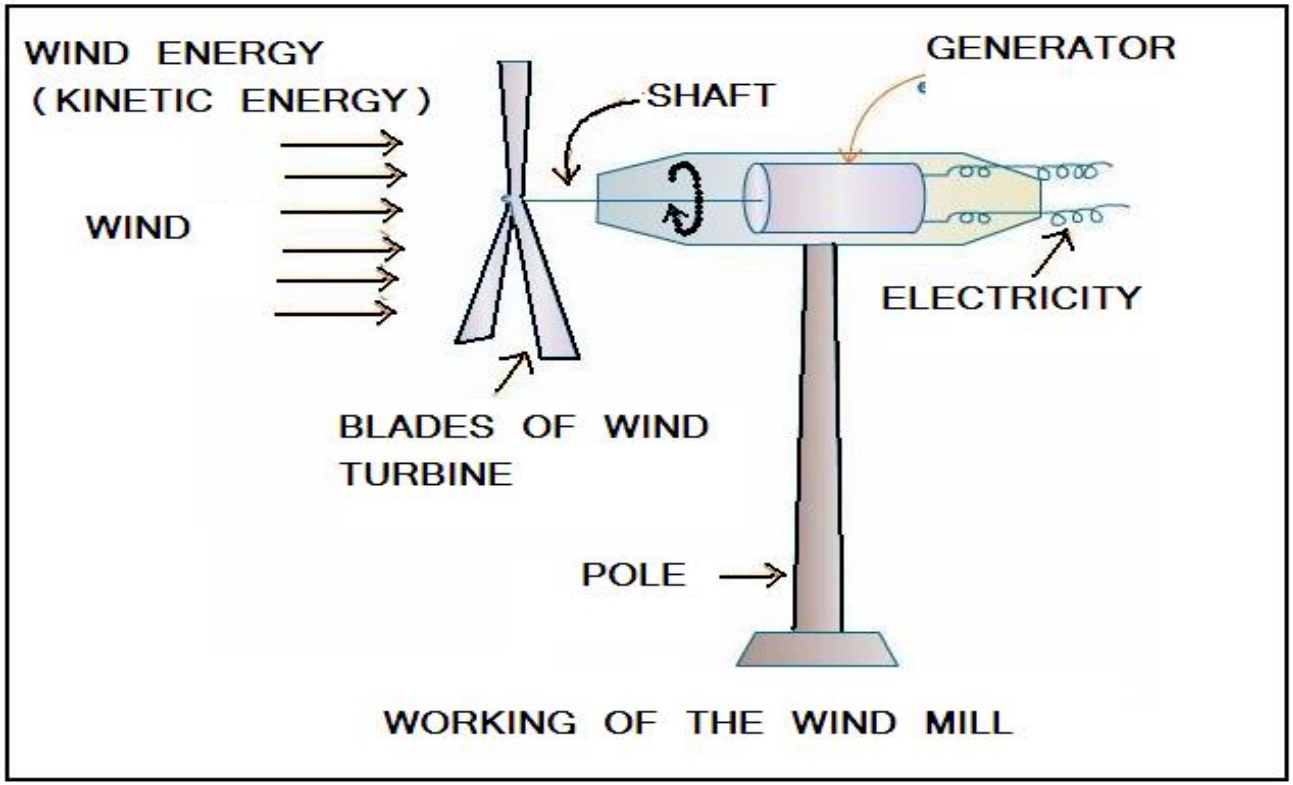
DISADVANTAGES OR LIMITATIONS:

- ✓Solar energy reaches the surface of earth in diffused form.
- ✓Solar energy is not available uniformly all the time and at all the places of the earth.
- ✓Solar energy is stored in Solar cells (=photovoltaic cells) which are very costly.

LECTURE-15: NON CONVENTIONAL SOURCES OF ENERGY: *SOLAR, WIND, HYDRO, TIDAL, GEOTHERMAL, BIOMASS & HYDROGEN* (AS FUTURE SOURCE OF ENERGY)

WIND ENERGY

The moving air is called wind. The wind has kinetic energy due to its high speed. The kinetic energy of wind is used to run windmills (i.e. machines which work with the kinetic energy of the wind).



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WIND ENERGY.....

- The minimum speed required to operate a wind mill is 15 km per hour (15 km/h).
- The windmills are used for grinding grains, lifting water and to produce electricity.

DISADVANTAGES (LIMITATIONS):

- It is not available all the time and at all the places.
- It depends on the velocity of wind.
- Wind energy farms can't be established everywhere. They can be established only at such places where wind speed is 15 km/h for the most part of the year.
- Setting up of wind energy farms is highly expensive.

LECTURE-15: NON CONVENTIONAL SOURCES OF ENERGY: *SOLAR, WIND, HYDRO, TIDAL, GEOTHERMAL, BIOMASS & HYDROGEN* (AS FUTURE SOURCE OF ENERGY)

BIOMASS ENERGY OR BIO-ENERGY (BIOGAS /GOBAR GAS)

BIOMASS:

***"Energy containing organic matter present in living organism, their waste and residue is termed as biomass"*. For ex: Cattle dung, plant waste etc.**

BIOENERGY or BIOMASS ENERGY:

***"Bio-energy refers to various forms of energy generated from biomass by using biotechnological methods"*. For ex: Biogas**

BIOGAS (GOBAR GAS):

It is a fuel obtained from animal dung indirectly. Biogas is produced by anaerobic fermentation (decomposition in absence of air) of animal dung and plant waste in biogas plant (digester tank).

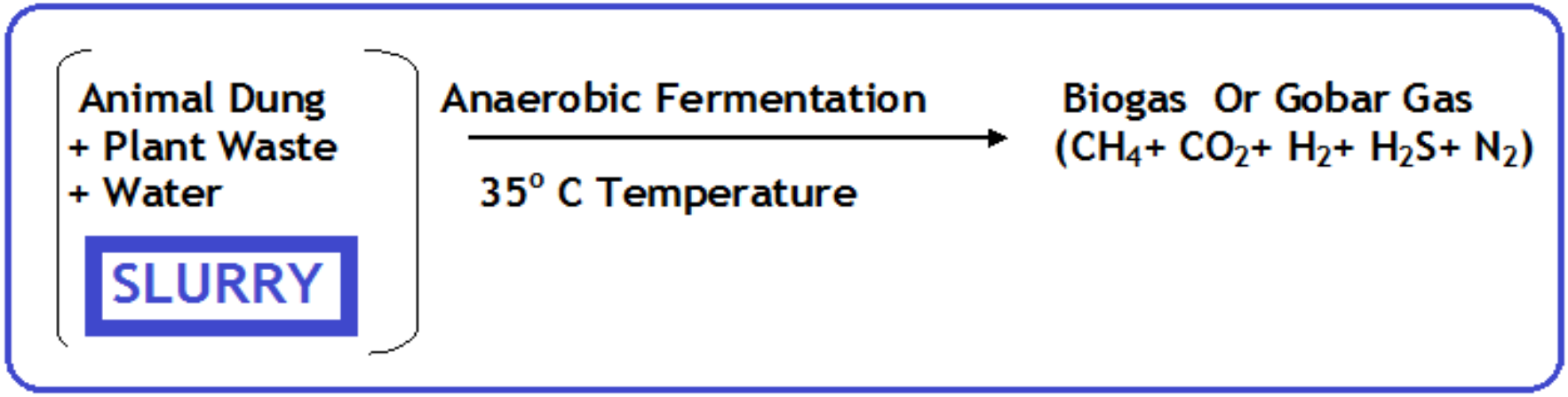
LECTURE-15: NON CONVENTIONAL SOURCES OF ENERGY: *SOLAR, WIND, HYDRO, TIDAL, GEOTHERMAL, BIOMASS & HYDROGEN* (AS FUTURE SOURCE OF ENERGY)

BIOMASS ENERGY OR BIO-ENERGY (BIOGAS /GOBAR GAS)

BIOGAS (GOBAR GAS):

Composition of biogas: Biogas is a mixture of:

Methane (CH_4)-63%,
Carbon-di-oxide (CO_2)-30%,
Hydrogen (H_2), Hydrogen Sulphide (H_2S) and Nitrogen (N_2) -7%



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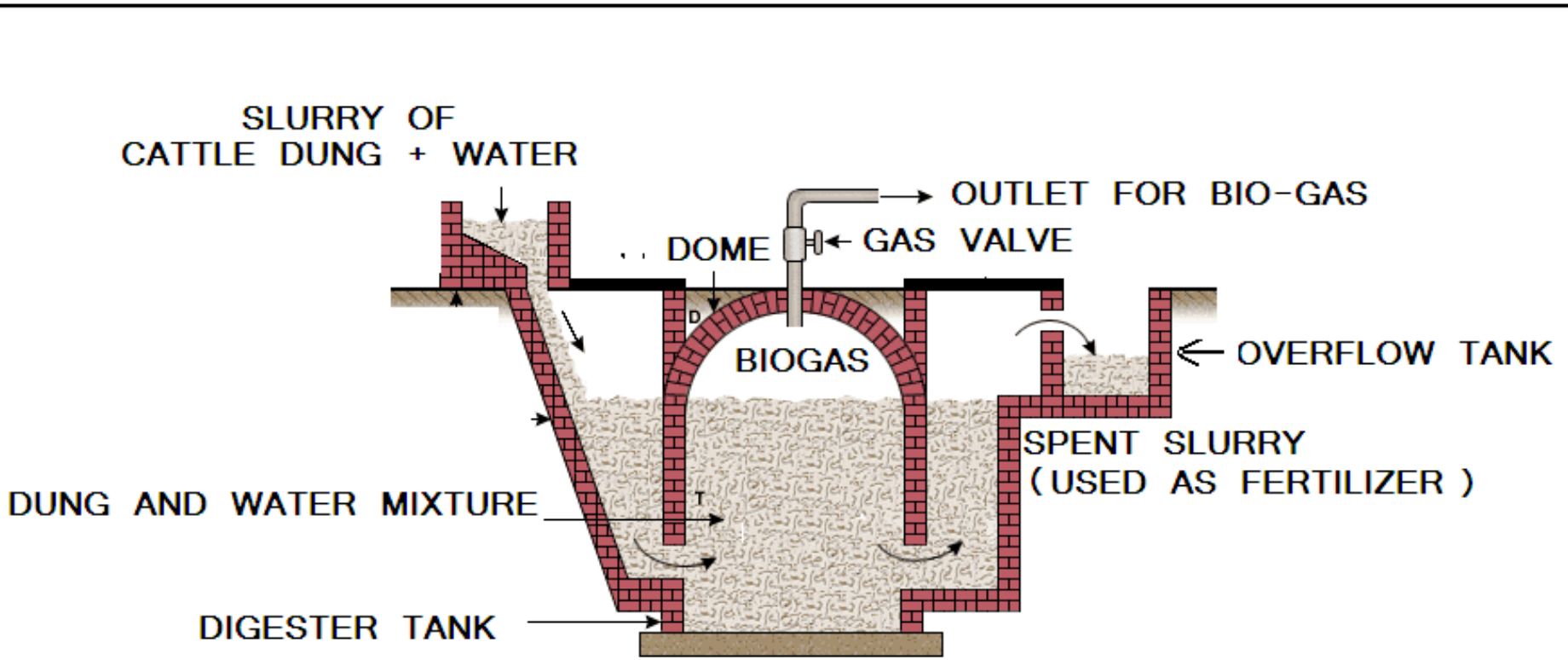
BIOMASS ENERGY OR BIO-ENERGY (BIOGAS /GOBAR GAS)



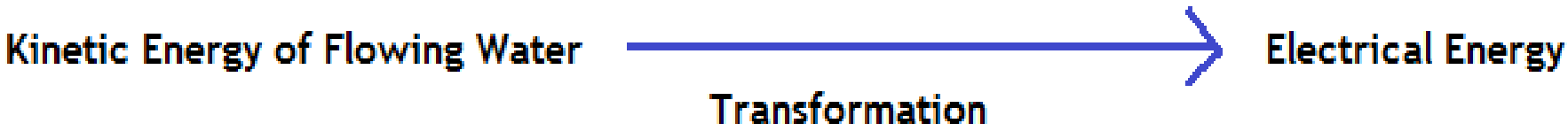
FIXED DOM TYPE BIOGAS PLANT

LECTURE-15: NON CONVENTIONAL SOURCES OF ENERGY: *SOLAR, WIND, HYDRO, TIDAL, GEOTHERMAL, BIOMASS & HYDROGEN* (AS FUTURE SOURCE OF ENERGY)

HYDRO ENERGY (HYDEL ENERGY OR HYDRO POWER)

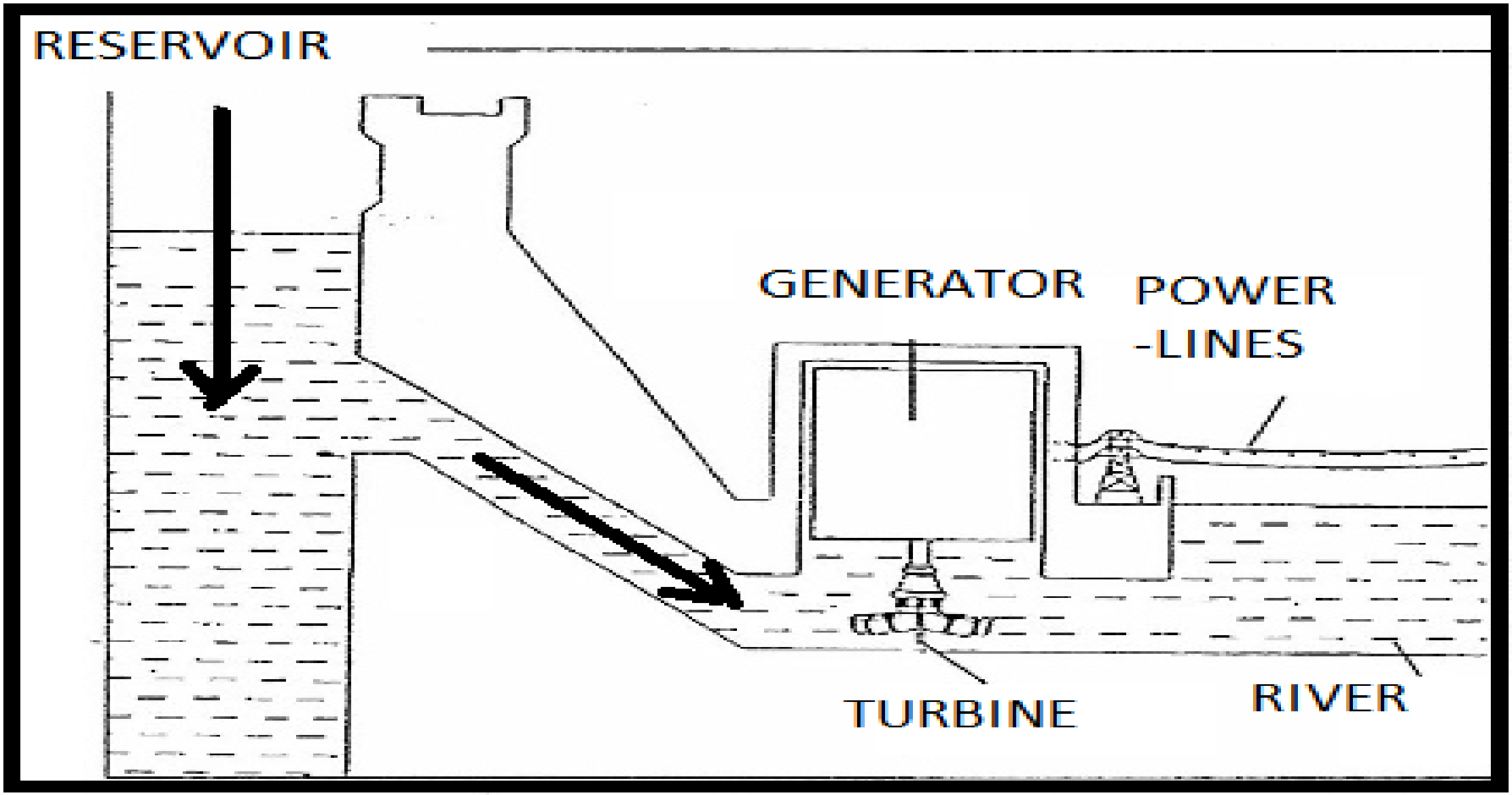
Flowing water has energy (kinetic energy) in it. In a hydroelectric power station, water is stored in a reservoir. This stored water is allowed to fall from a great height which rotates the wheels (blades) of turbine. The turbine rotates the generators to produce electricity (hydroelectricity).

IN A HYDROELECTRIC POWER STATION



LECTURE-15: NON CONVENTIONAL SOURCES OF ENERGY: *SOLAR*, *WIND*, *HYDRO*, *TIDAL*, *GEOTHERMAL*, *BIOMASS* & *HYDROGEN* (AS FUTURE SOURCE OF ENERGY)

HYDRO ENERGY (HYDEL ENERGY OR HYDRO POWER)



LECTURE-15: NON CONVENTIONAL SOURCES OF ENERGY: *SOLAR, WIND, HYDRO, TIDAL, GEOTHERMAL, BIOMASS & HYDROGEN* (AS FUTURE SOURCE OF ENERGY)

VARIOUS BENEFITS AND ENVIRONMENTAL PROBLEMS ASSOCIATED WITH DAMS/RIVER VALLEY PROJECTS/HYDRO-ELECTRIC POWER PLANT

Purpose or benefits of dams:

- For power generation (=hydroelectric generation)
- Irrigation during dry period
- Fish farming (= fishery)
- Flood control and soil protection
- Transfer of water to water deficit areas through canals
- Provide drinking water in remote areas

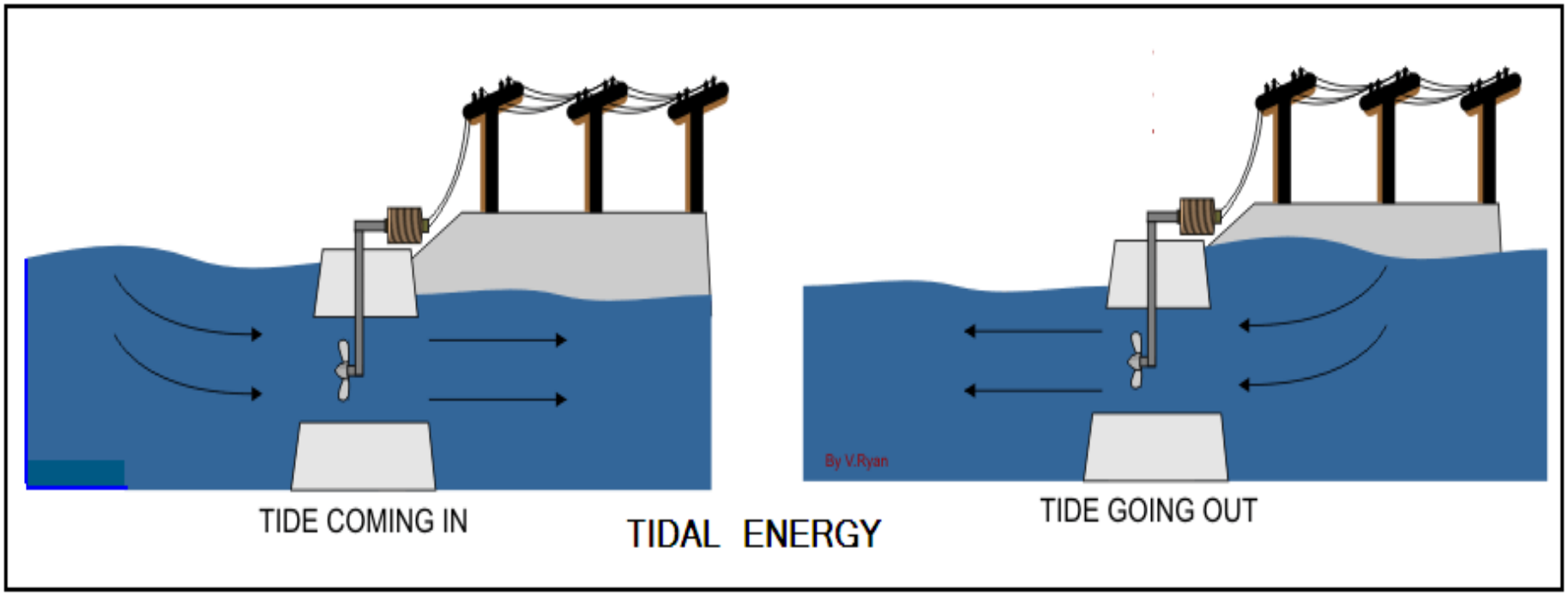
Effects or environmental problems due to dams:

- Deforestation
- Loss of flora and fauna
- Displacement of tribal people
- Resettlement & rehabilitation problem of displaced people
- During earth quakes dams can collapse which results in flash flood which result in loss of life and property.

LECTURE-15: NON CONVENTIONAL SOURCES OF ENERGY: *SOLAR, WIND, HYDRO, TIDAL, GEOTHERMAL, BIOMASS & HYDROGEN* (AS FUTURE SOURCE OF ENERGY)

TIDAL WAVE ENERGY

The energy from rise and fall of tides in the ocean is called tidal energy. Tides are caused due to the gravitational pull of moon and due to earth's rotation. The tidal movement of water has a lot of energy which is used to produce electricity.



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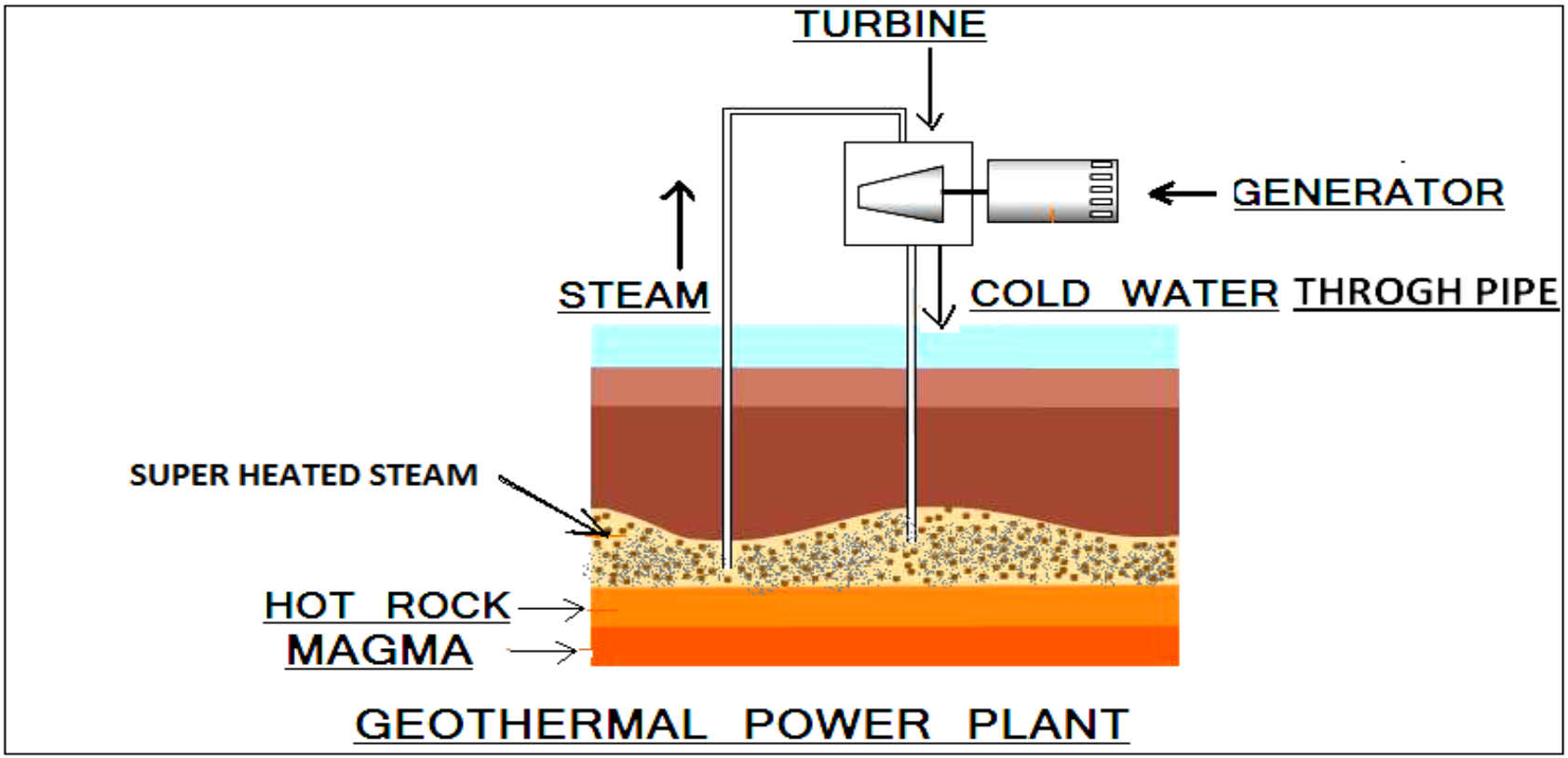
GEOTHERMAL ENERGY

It is the heat energy from interior of the earth. This heat energy is utilized for power generation. .



LECTURE-15: NON CONVENTIONAL SOURCES OF ENERGY: *SOLAR, WIND, HYDRO, TIDAL, GEOTHERMAL, BIOMASS & HYDROGEN* (AS FUTURE SOURCE OF ENERGY)

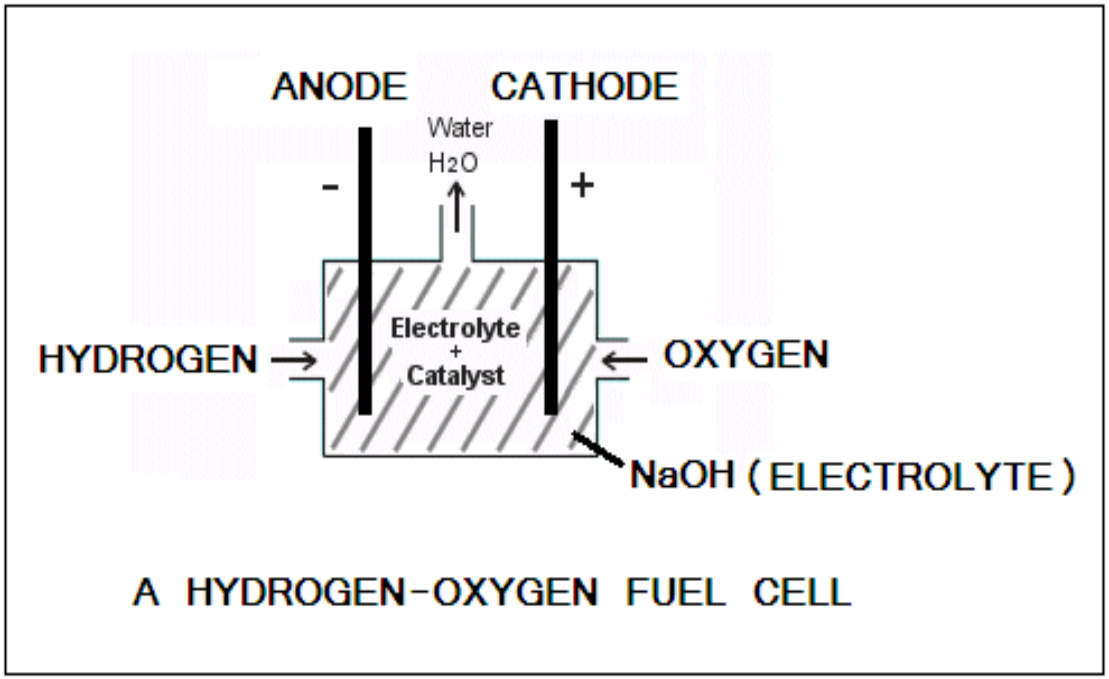
HYDROGEN ENERGY AS AN ALTERNATIVE FUTURE SOURCE OF ENERGY:

- **Hydrogen is the simplest element known to man. It is the most plentiful (abundant) gas in the universe.**
- **Since hydrogen does not exist on earth as a gas, we must separate it from other elements. We can separate hydrogen atoms by decomposition of water.**
- **It can also be easily obtained from natural gas or methanol or coal.**
- **Hydrogen acts as the basic requirement for fuel cells (Hydrogen-Oxygen Fuel Cell)**
- **Fuel cells are electrochemical devices that convert chemical energy of fuel in to electrical energy.**

LECTURE-15: NON CONVENTIONAL SOURCES OF ENERGY: *SOLAR*, *WIND*, *HYDRO*, *TIDAL*, *GEOTHERMAL*, *BIOMASS* & *HYDROGEN* (AS FUTURE SOURCE OF ENERGY)

HYDROGEN ENERGY AS AN ALTERNATIVE FUTURE SOURCE OF ENERGY:

A Hydrogen-Oxygen fuel cell consists of electrolyte (NaOH or KOH) sandwiched between two electrodes (porous graphite electrodes). Fuel cells need hydrogen to generate electricity.



A HYDROGEN-OXYGEN FUEL CELL

LECTURE-15: NON CONVENTIONAL SOURCES OF ENERGY: *SOLAR, WIND, HYDRO, TIDAL, GEOTHERMAL, BIOMASS & HYDROGEN* (AS FUTURE SOURCE OF ENERGY)

HYDROGEN ENERGY AS AN ALTERNATIVE FUTURE SOURCE OF ENERGY:

FUTURE APPLICATIONS OF HYDROGEN:

- As energy carrier because it is renewable and non-polluting.
- In electricity production using fuel cells
- As a fuel for zero emission vehicles

ADVANTAGES OF HYDROGEN AS FUEL:

- It has very less emissions.
- It is a pollution free fuel.
- It bears a high level of energy
- It bears a higher efficiency rates.

DISADVANTAGE:

- Its low availability in pure hydrogen form in the environment.
- Highly inflammable and explosive.
- Safe handling is required for using hydrogen as a fuel.
- High safety measures in storage and transportation.

LECTURE-16: FOREST RESOURCES (AVAILABILITY), FUNCTIONS OF FOREST, DEFORESTATION (ITS CAUSES, IMPACTS AND CONTROL MEASURES)

FUNCTIONS/VALUES/ROLE OF FOREST

ECONOMIC ROLE	ECOLOGICAL ROLE	
(PRODUCTIVE FUNCTIONS)	PROTECTIVE FUNCTIONS	REGULATIVE FUNCTIONS
❖ We get a lot of valuable products from forests. For example : • Fruits • Fodder • Fuel wood • Fibres • Wood for furniture • Gums • Resins • Rubber • Honey • Medicines • Essential oils etc.	• They provide protection to wild animals. • Forests act as a habitat (=home) for wild animals. • They protect against Soil Erosion, Flood and Drought and landslide. • They help to conserve soil and water	• They regulate climatic conditions. • They regulate atmospheric temperature. • They regulate water cycle • They regulate energy flow • They regulate material flow or nutrient cycling or Biogeochemical cycle (C,H,O,N,P,S cycle) • They purify air (atmosphere). • They control environmental pollution. • They help in soil formation.

LECTURE-16: FOREST RESOURCES (AVAILABILITY), FUNCTIONS OF FOREST, DEFORESTATION (ITS CAUSES, IMPACTS AND CONTROL MEASURES)

DEFORESTATION

Deforestation means removal (=cutting down the trees) or destruction of forest cover or felling of trees of an area.

CAUSES OR FACTORS LEADING TO DEFORESTATION:

The forests are being cut or cleared because of the following reasons:

- **For Fuel wood:.**
- **For Agricultural purpose:**
- **For Development projects:.**
- **Industrial purposes:**
- **Urbanization**

LECTURE-16: FOREST RESOURCES (AVAILABILITY), FUNCTIONS OF FOREST, DEFORESTATION (ITS CAUSES, IMPACTS AND CONTROL MEASURES)

DEFORESTATION.....

ENVIRONMENTAL IMPACTS OF DEFORESTATION:

- Loss of greenery
- Difficulty in survival of tribal people.
- Destruction of habitat of wild animals
- Loss of wild animals
- Loss of biodiversity
- Decrease in rainfall
- Environmental pollution

LECTURE-16: FOREST RESOURCES (AVAILABILITY), FUNCTIONS OF FOREST, DEFORESTATION (ITS CAUSES, IMPACTS AND CONTROL MEASURES)

DEFORESTATION……

CONTROL OF DEFORESTATION:

- Public participation through environmental education, training and creating awareness.
- By Afforestation & Reforestation programme
- Use of alternative resources of energy in place of fuel wood
- Unauthorized felling of trees should be stopped
- By Joint Forest Management Programme
- Establishment of National Parks and Wildlife sanctuaries
- Implementation of rules and regulation (For ex: Forest Conservation Act, 1980)

LECTURE-16: FOREST RESOURCES (AVAILABILITY), FUNCTIONS OF FOREST, DEFORESTATION (ITS CAUSES, IMPACTS AND CONTROL MEASURES)

FOREST CONSERVATION

The following measures are recommended for the conservation of forests:

- Environmental awareness and public participation
- "Tree for a tree" principle should be adopted
- By Afforestation & Reforestation programme
- Use of alternative resources of energy in place of fuel wood
- Unauthorized felling of trees should be stopped
- By Joint Forest Management Programme
- Establishment of National Parks and Wildlife sanctuaries
- Implementation of rules and regulation (For ex: Forest Conservation Act, 1980)

LECTURE-16: FOREST RESOURCES (AVAILABILITY), FUNCTIONS OF FOREST, DEFORESTATION (ITS CAUSES, IMPACTS AND CONTROL MEASURES)

ENVIRONMENTAL MOVEMENTS

Various environmental movements, held time to time for the conservation of forests.

For example:

a) **BISHNOI MOVEMENT**

b) **CHIPKO MOVEMENT**

c) **APPIKO MOVEMENT**

d) **SILENT VALLEY MOVEMENT**

THANK YOU