SOCIAL STRUCTURE & DYNAMICS

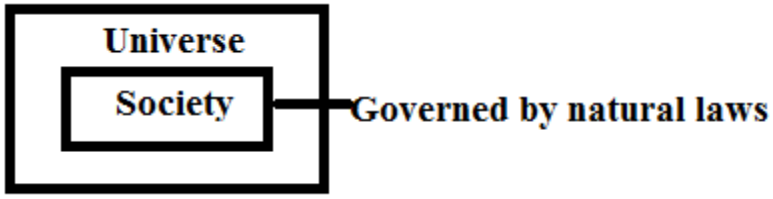
INTRODUCTION

Principles of science (or) construction of law's of human society by applying tools of science i.e observation, data collection, verification & generalization.

Sociology

It as a science of order & progress & can't be studied without the help of scientific methods. Auguste comte.

Note: Universe made of natural laws & Society is a part of the universe.



Society discovers law's by applying scientific procedures like observations, data, collections, verifications & generalizations. They are called the analytic & Synthetic approach to social problems.

Synthetic approach stages for construction laws.

1. **Problem Formulation** (Step to attain objective/Proposal.)
2. **Hypothesis (Tentative conclusion)**

It discard's irrelevant factor's & find correlation b/w 2/more event's. Here the stmt needs to be tested through various observations.

3. Observation

Done through history records/Survey, Questionaire (or) Interview methods (or) other Techniques used by social scientists.

4. Classification: Facts observed & collected should be classified.
i.e. special arrangement of facts.

5. Verification

Valid for all cases with similar conditions. When our assumption is proved true all over, it can be accepted as a law (or) principal.

ANALYSIS OF BASIC SOCIOLOGICAL CONCEPTS & THEIR APPLICATION TO CONTEMPORARY SOCIETY

Sociology = Science of society. It deals with all the problems of human's beings living in a society.

Social problems were

1. Understand & Analysis of social problem

Plan & work according to the needs of the modern society.

2. Planning & proper distribution

Available Natural resource to various economic activities according to their importance.

3. Problems solution

Identify (serious problems) & sociology can amicably be solved.

4. Economic & Political Reconstruction

It removes social disparities & giving social justice to the society.

5. Custom's & Traditions

It help's in promoting national unity & integrity.

6. Understand and social Institutions

It helps to understand existing social institutions (Family, school, religion etc). It = sociology.

7. Sociology in industry

It helps the engineer's to understand the existing conditions, namely aptitude, character, religions & sentiments of the local people in a contemporary society.

8. Sociology for democracy

Government reconstruction the social justice & economic equality can be imparted.

SOCIAL SYSTEM & INSTITUTION

Units of loyalty are

1. Family (child respect elder's feeling's or otherwise)
2. School (child learn, follow rules & regulation, respect other's).
3. Religion (It's a practice)
4. Science (people learn to search for truth).

SOCIAL STRATIFICATION

1. Every society is divided by castes & classes.
2. It is the division of society into permanent group's based on the concept of inequality.
3. **Types of stratification**

A. Economic. B. Political. C. Religious. D. Social.

Economic: Rich people buy machines they are owner's other are workers.
Political: Win reader's other ruled.
Religious: People – orthodox. Un orthodox.
Social: Casteism plays important role in stratification of the society.
Brahmins & Kshatriya's – higher strate sudra's & vaisyas – lower strata in social system.

Silent features of stratification in society

1. It varies from society to society.
2. Society, occupation, status of each class.
3. Low income group, Middle income group, High income group
4. Influenced by Technology (Industrialization & urbanization), government policies.
5. Lower class tries to reach higher.
6. Each class performs particular type of work.

Advantages of Stratification in society

It exists is agricultural/Industrial, developed/Underdeveloped, rural/Urban stratification exist in the world.

1. People responsible for the work they are doing.
2. Competition among people in a society (lower strata tries to come up in their life).
3. Locate people in the society based on capability resources & intelligence.

Stratification in Indian society

Brahmin, Kshatriya – higher strata. Others – lower strata. Zamindari (or) feudal system came into existence. Education, fields of literature, poetry, philosophy attain higher strata.

Correlation between social strata & Economic classes

1. A social class divides the society into various group's depends social, religious & political factor's.
2. Member's of each class have more or less the same living standard.
3. Every society is divided into 2 parts.

A. One side **capitalists** who have money & resources in adaption to political powers.

B. Other side Worker's who have nothing but their labor to help them out.

Class & Caste

Class creation is the function of social stratification, has no social division.

Features of social class

1. Persons place is not inherited.
2. No inter class marriages.
3. Restrictions on custom's, behavior etc.
4. Free to choose occupation.
5. No restrictions of choose of religion.

Features of social class system

1. Caste system an extreme form of closed class system. Caste system in.
2. **Greek society** – citizens, helots & slaves.
   Roman society – patricians, plebeians & slaves.
   Japanese society – nobles, military personnel, commoner
3. Man provides with his place his carrier, his occupation & his circle friends.
4. Unity & harmony may be stated as the biggest contributor of the caste system.

Attributes of caste system

1. Person remains in same caste
2. Difficult to leave one's caste.
3. Inter-caste marriages.
4. Restrictions on members of particular caste.
5. Bound to religious orders.

Income Distribution

It is benefiting a person gets for his labor, property, investment (or) business.

Types of income

Personal	National	Group
Earned & unearned income	Legal & Illegal income.	

1. Distribution of income comes into force during the feudal system rich, poor.
2. Trade Union act regulate wages for workers to safeguard.
3. Income distribution will bridge gap between the rich & poor.
4. It creates many social, economic & political problems.
5. Distribution means giving each share of productivity.

Pareto's law = level of income

$N = AX - X$

X = level of income. N = No of income recipients
A, X are statistical parameter's X = Measure of inequality.
X – Inequality.
Competent worker earning's more kautilya indicates the standard of living theory of wages.
Wages X (Work done + Time taken)

SOCIAL TENSION & ITS CAUSES

The inter & intra conflicts in the society appear due to the individual ego & self interest in terms of money, status, position & power.
Society – conflicts (Infra and inter) – ego, interest for money etc.

Causes of societal tension

1. Urbanization: Old people are left behind the villages.
2. Unemployment: Machines replace men.
3. Social stratification.
4. Pollution: Factories, Industries, smoke, dust water, air, soil.

Bureaucrats often show their superiority in controlling the specialists & constantly interfere in the matter's which completely belong to the specified areas of the specialists.

CONFLICT MGMT IN THE SOCIETY

Bureaucracy & the technology hostility, confrontation & great tension.

Conflict Mgmt & societal Responsibility

1. Conflict arises when men strive to attain mutually exclusive interests resources are limited.
2. Fertile lands are grabbed from weaker section, conflict is bound to occur.
3. Ambitions within the framework of human co-operation, conflict becomes beneficial to the society.
4. Conflict creates violence & destruction.
5. A famous American president said doesn't ask what your country given you; ask what you give to your country.
6. A society may be affected by corruption, if it fails to meet the pressing needs of citizens. This will lead to adopt non-legal means by citizens. Corruption enters the society. It the control system is able to detect like India factors interfere & encourage corruption & so the people escape from the punishment.
7. Corruption enriches the employees tempted to earn money in illegal ways normal behavior.
8. If it affects the moral & ethical values of the system.
9. People have no moral/ethical values in earning money.
10. The fear of punishment should be created in the mind of people whether they are political leaders (or) bureaucrats (or) commoners.
11. Righteousness alone will keep the people on the right track.

Development Process

INTRODUCTION

Development is differing from growth.

Growth: It is an expression of quantitative expansion of economic system.
Development: It is a qualitative concept incorporating notation of improvement & progress in cultural social & economic fronts.

World countries

Classification – based on economic conditions (**Developed & Undeveloped**)
Rich & prosperous, per capita income is high – Have agricultural economics.

PARAMETER'S FOR DEVELOPMENT

No of quantitative/Qualitative parameters constitute the development of society.

National & per capita income

A. Output – productivity – National income national income is a measure of country progress.
B. Economic development means not only.

Rise in national income but also a rise in the per capita income with qualitative changes in the economy like removal of poverty, reduction in the inequalities of income, increase in the literacy rate etc.

Investment & saving

Essential for the economic development of a country. After consumption surplus (extra Amount) used for investment purpose to increase productivity leads to economic progress In India surplus used for unproductive purposes like marriage, religious functions, purchasing jewelers etc.

Urbanization: The economic standard of urban people is high as they have more avenues. Thus urban life help's the economic progress due to technological advancement generally more educated & are well employed.

Education

It must aim in inculcating in the people a scientific attitude, a respect for democratic values, a sense of public morality, and an intelligent awareness of their own environment.

Status of women: They are considered below the men in the society. They have not given equal high education & nor right's in rural areas.

Population: Pressure of population is also important.

Infrastructure

It is the basic factor needed for economic development of supporting element which are necessary for the production process. Industrial production requires machinery, man power, management, raw materials, energy, transport, communication, banks marketing, etc.

All these constitute the infrastructure for the productivity. Its maintenance & its expansion are the essential conditions for economic development.

Energy

It enables man to control, capture & exploits the forces of nature & it improve the quality of life.

Science & Technology

1. Used in economic modernization
2. Scientific knowledge & skill, so that s/he can rise in the society economic ladder.
3. A package of appropriate technology to varying local conditions should be available or else must be developed through research.

Integrated Plan: Plant trees, use organic fertilizers, crop planting to suit the soil conditions, use of renewable energy technology like biogas, solar power, irrigation Mgmt, etc. should be the part of an integrated plan for all sector activities.

People's participation

Government policies people's involvement in the development process & economic growth.

Obstacles for underdeveloped countries in the national development as grouped as follows.

1. Economic factor. 2. Social factor. 3. Scientific factor.

Elements of Poverty

Less production→low income→less Food →less stamina→ Less production→low income→less Food →less stamina

Low income – less production – less – food – less stamina.

Economic factors

1. Poverty	2. Unemployment	3. Percapita income
4. Industrial production	5. National income.	6. Banking & transport facility.

Social factor

1. Education: Literacy remains at a very low level in the developing countries.
2. Social Institution: Joint family system continues to dominate, no incentive to work hard.
3. Caste (Women status below men, rights, education.)
4. Population

Scientific factor

1. Scientists & engineer's are constantly working to produce new machines, alternate fuels etc.
2. it's not possible as the natural resources are not fully exploited because of low technology & less capital development. Agriculture – fertilizers & Pesticides.

RELATIONSHIP BETWEEN ECONOMICS, SOCIAL & SCIENTIFIC FACTORS

1. Economic development is not possible without the social change & technology.
2. Economic development brings social prosperity, better education, quality food & shelter etc.
3. Scientific factors bring about the economic advancement.

Role of science & technology in the development process

1. National property depends on 3 factors (Technology, Raw materials, Capital).
2. Application of science. 3. Resource utilization industries

Economic growth & social development: Economic development of a particular area depends on total development of the area. Area Development – Economic development – part

Role of planning in the development process

It is a part of development & advancement in all the countries of the world.

Objectives of planning

1. Standard of life rise. 2. Adequate resources. 3. Utilize resources.
4. Rapid industrialization. 5. Creation of infrastructure power, banking, transportation, communication etc. 6. Attitude. 7. Inequalities of Income & wealth reduction.

Assessment of planning for the social Development

1. It is required to assess the quality & quality of human, physical & capital resources of the country before planning for the social development.
2. We should develop indigenous technology appropriate to national priorities & resources.

TARGETS IN PLANNING

1. Use of science & technology in planning. 2. Planning for science & technology.

Issues in targets

1. Population control 2. Food. 3. Industries. 4. Human resources. 5. Conservation

Population control: Skill, growth rate of population.

Food: 1/3rd of national income & about 2/3rd of labor force engaged directly in agriculture.

Country	% of Total population	Country	% of Total population
India	60.9	USA	1.9
Bangladesh	82.8	Japan	9.2

Measures to achieve the targets

1. Intensive agriculture.
2. Rainfall forecasting
3. Water Mgmt.
4. Soil conservation.
5. Improvements in yields.
6. Exploration of ocean beds.
7. Conservation of storage & packing foods.
8. Fertilizer's production improvements.
9. Education to farmer's.
10. Prevent soil erosion & flooding.

Industry: Research should be made in intension in all fields of economic activity.

Human Resources: Employment

Conservation: It is a important factor in the process of development & planning

Resources: 1. Human. 2. Material. 3. Energy.

Idea's to conserve our resources

1. Fertilizer's technology exploration. 2. Water policy introduced.
3. Food storage & conservation technology should be adopted.

Technology Assessment

HISTORICAL DEVELOPMENT OF SCIENCE & TECHNOLOGY IN INDIA VARIOUS FACETS OF SCIENCE & TECHNOLOGY

Astronomy

The branch of science which deals with celestrial objects, space & the physical universe as a whole.

Mathematics

*, v-, P/Q, 0, natural no – 11th century integer's, fractions, permutations & 12th combinations.

Medicines: Food preserves & beverages were also developed.
Chemistry: Used as medicines, fireworks & weapons.
Metallurgy: Copper, iron, gold, silver cannons & guns were made of brass & Iron.
Artillery & navigation: Heaviest guns.
Agriculture: Horticultural practices
Transport: Cart transportation
Textile technology: Direct block printing (Silks, cottons & brocades).

CRITERIA FOR TECHNOLOGY ASSESSMENT ISSUES

1. Criteria for assessment of technology
2. Appropriate technology syndrome
3. Pitfalls of technology transfer.
4. Criteria for success for transfer of technology from laboratory to field & from one socio-economic system to other.
5. Technology adaption & development.

Indigenous technology & foreign technology assessments criteria

1. The developing countries depend on more developed countries (create & adapt new technologies).
2. Indigenous technology will have no scope for further development.
3. Indigenous technology developed with the help of imported technology.

Factors to be considered before introducing a new technology

1. Needs of people should be understood.
2. Analyzing sales of products should be made.
3. Study of mgmt structure for application of new technology.
4. Close watch of new technology. 5. Communications.

TECHNOLOGY TRANSFER

It is a set of operations to achieve desired outputs from given inputs by application of science.
Pre-historic age – No Technology
Paleolithic age – Tools (Knife, hammer etc)
Machine age – Industrial revolution
Computer controlled – Information processing
Machine age Or Information age

T method of technology transfer
10 points which can be applied to technology transfer.

Preliminary studies
1. Selection, training & role of technology transfer.
2. **Creation of system**
Scientific & technical equipments, Standard procedure & process technology.
3. **Organization**
Social & economic structure of the society is able to adopt the technology change easily.
4. **Recruitment** Job's affected by the new technology.
5. **Training Trained** people are responsible for everything.
6. **Group Training** Inter staff group
7. **Mobility of whole** Permanent speed in the transfer.
8. **Measuring results & corrective action**
1st control educational tools 2nd control actual progress of each trainee.
9. **Creation of an overall plan** before starting the project
10. **Appropriate technology syndrome** Government tries to remove
Unemployment, fulfill basic needs, improve studies of common masses

Assessment criteria for imported technology
1. Absorption, adoption & development (know-how) imported technology should make use of local resources & should be up-to-date.
2. It should generate gainful & satisfying employment opportunities & the technology should internally be competitive.
3. Indigenous & imported technology.
4. Both skilled & unskilled labors are required.

Criteria for selection of industry for technology transfer
1. Significant contribution to economy. 2. Weaker sections of society involve
3. Employment 4. Financial benefits to industry
5. Growth 6. Study technology impact.

Social & Cultural restrictions
1. Cattle graze in open area's cow dong the principal material for the biogas plant is used by villagers as fuel & fertilizer.
2. The minimum requirement 4 to 5 cattle means that the biogas plant can be installed by financially strong farmer's only.
3. Cow dung into methane gas doesn't seem worthwhile as the farmer's need for energy is met by collecting wood from the vicinity locally.

Safety: Handling & storage of methane gas.
Mgmt: Handle plants.
Technical: Burner's are technical problems, which can't be handled easily by farmers.
Causes of failure of technology transfer: Lack of experienced technology.

Technology transfer from laboratory to field

1. Simulation and modeling are keywords of technological advancements.
2. Good models can yield excellent results & technology advancement increases by leaps & bounds.

Aerodynamics: Planes

Performance of metals: Due to fatigue.

Reasons of failure of technology transfer from laboratory to field:

Bad model: Results failure

Bad simulation of Environment

Wet conditions – success and Dry conditions – Failure

Hasty (or) Wrong Interpretation of Laboratory Results

Aero plane modeling depends on wing structure. Use math's for practice on small scale.

Ecology & Eco system

INTRODUCTION

Ecology = Science of interactions among individuals, populations & communities. Or
It also involves the interaction of living (biotic) components with non-living (abiotic) ones of environment.

Ecology comes from 2 Greek words	
Oikos (household/home)	**logos (study)**

It deals with organism & its place to live population = group of individuals of any one kind of organism. Biotict Abiotic components of Environment Function together as an ecological system or ecosystem.
Community Classifications

Ecology Classification	
Auto ecology (Deals with Individual species).	Synecology (community)

Other way

Ecology Classification					
Pale ecology	conservation	Resource	pollution	system	etc

ECOLOGY OBJECTIVES

1. Distribution of large (abundance) of organism (**Local, Geographical**)
2. Temporal changes in the occurrence of activities organism.
3. Inter-relation b/w **organisms** in population & **communities**
4. Structural adoptions & Function adjustments of organisms to their physical environment.
5. Behavior of organisms under natural conditions.
6. Biological productivity of nature & how this may best serve mankind.
7. Conservation & mgmt of natural resources & pollution.

ECOLOGY IMPORTANCE

It increases understanding of world & its life our survival depends on ecological relationship's throughout the world. World contains places (Atmosphere Affect, Environment & Us).

Ecology = **branch of biology** = multi disciplinary ecologists uses knowledge from many branches include chemistry, physical, math's, computer science.

Depends on climatology, geology, metrology & oceanography to learn about air, land, water environments & their interactions. Understand = physical environment affects the living thins & helps in assessing the impacts of environment problems.

Environment = Influence organisms anyway.
Any day = Direct/Indirect on Activities of organisms.

Environment include external factors
(Soil, air, water, light, temperature, humidity) etc. which influence directly on activities of organism. Environment –> habitat – >place (plants or animals) grow & live.
Part of environment = ecological/environmental factors.

Ecological factor

They are known as **limiting factors** of the **growth of living organism** in the environment

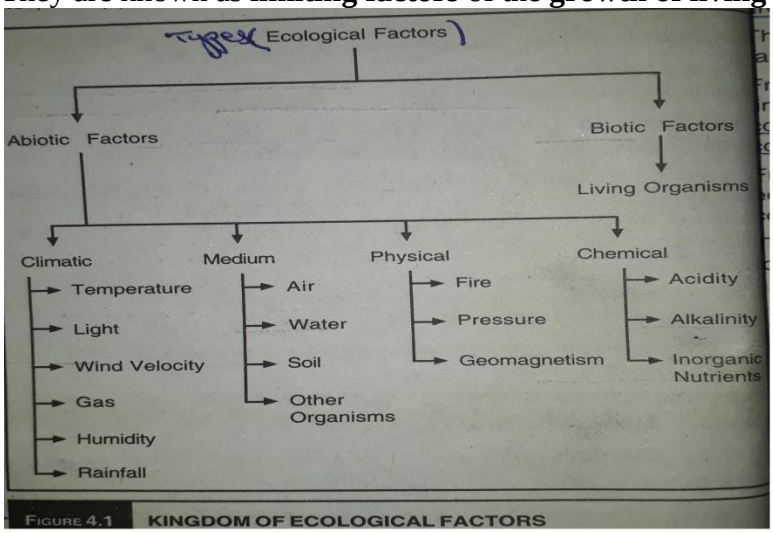
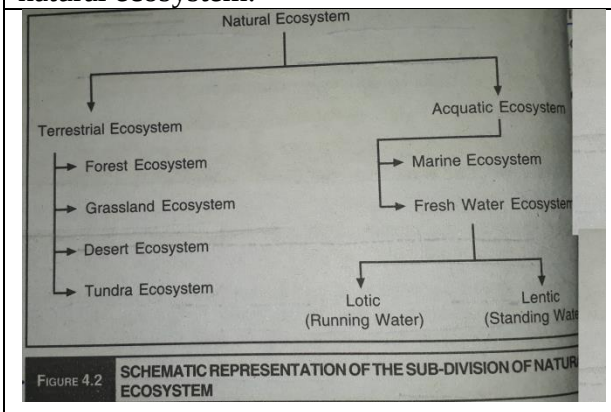
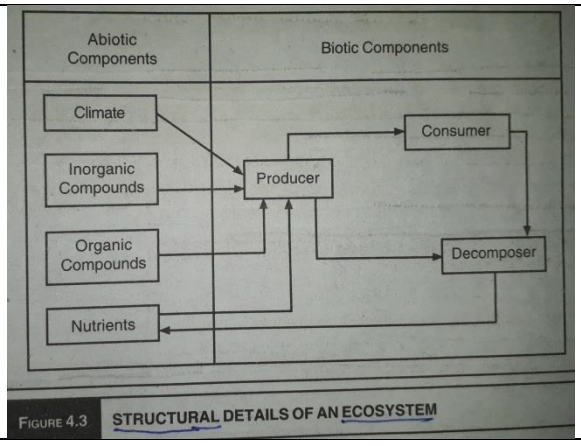


FIGURE 4.1 KINGDOM OF ECOLOGICAL FACTORS

Types of ecological factors: 1. Abiotic. 2. Biotic factors.

ECOSYSTEM

1. Technical term for nature used by ecologists.
2. It includes organisms of a living area interact with physical environment

Types of ecosystem	
Natural	**Artificial**
Like pond, forest, stream, ocean, grassland etc are self regulating system without much direct human Inferences & manipulations are called natural ecosystem.	The city & cropland ecosystem are manmade ecosystem are called artificial ecosystem. Ex Aquarium
 FIGURE 4.2 SCHEMATIC REPRESENTATION OF THE SUB-DIVISION OF NATUR ECOSYSTEM	 FIGURE 4.3 STRUCTURAL DETAILS OF AN ECOSYSTEM

Biosphere / Ecosphere

The portion of the earth in which biotic components are present is called the biosphere/ ecosphere. Abiotic = non living. Biotic = living

Nutritional point of view (tropic): 2 components
1. Autotrophic: Which organisms fix light energy & utilize substances like carbon dioxide co2 & water (H20) to produce complex food materials.
2. Hetero tropic: Organisms utilize, rearrange decompose the complex materials. Synthesized by the autotrophic components.

Abiotic components classification

Inorganic	Organis substances	Climatic conditions
(C, N, Co2, H20, etc).	carbohydrate, proteins, lipid etc	temperature humidity etc)

Biotic components
1. Producer (Autotrophic organisms) generally green plants which are able to manufacture food. With the help of abiotic components.
2. Consumer: (heterotrophic organism's) animals which ingest other organisms (or) get food directly from producer.
3. Decomposer: Microscopic organisms (bacteria & fungi) break down & decompose the complex. Substances of dead organisms (producers & consumers), absorb the decomposed products & release inorganic nutrients for the revise by the producer's

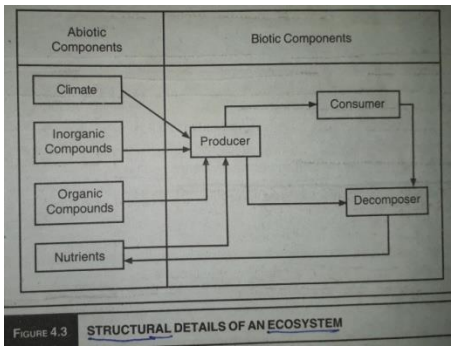


FIGURE 4.3 STRUCTURAL DETAILS OF AN ECOSYSTEM

ENERGY FLOW THROUGH ECOSYSTEM
1. In the from of carbon-carbon bonds.
2. When respiration takes place, the carbon-carbon bonds are broken & carbon is combined with oxygen to form carbon dioxide. This process releases energy, which is either used by the organism (or) may be lost in the form of heat (Uni directional).
3. Dotted arrows represent the flow of inorganic nutrients.
4. Autotrophs obtain these inorganic nutrients from the inorganic nutrient pool (like soil, water, etc).
5. Inorganic nutrients are passed from organism to organism as one organism consumed by other's & organisms die & become detritus food for decomposers.

FOOD CHAIN
Autotrophs (green plants) convert solar energy & stored in food material at the time of photosynthesis & are known as producer's & transfer food to other organisms know as food chain series. Autotrophs (green plants)/Producers – feed - other organisms (consumer)

Characteristics of food chain

1. Producer
2. Nutrient level/Tropic level layer.
3. Food chain size increase/decrease.
4. Energy flow unidirectional.
5. (Food chains) connected called food web.

Classification of food chain

1. Predator Food chain: Food chain start from producer & ends at highest level of consumer.
Plant – grasshopper – toad – snake.
2. Parasitic food chain: Start from big host & ends to the parasite animals.
Man – warm – protozoa.
3. Saprophytic food chain: Starts from dead organisms & ends to bacteria (decomposers).
Dead/Plant – animal – fungi – bacteria.

FOOD WEB:

No of food chain's connected called as food web. Primary consumers, secondary consumers.

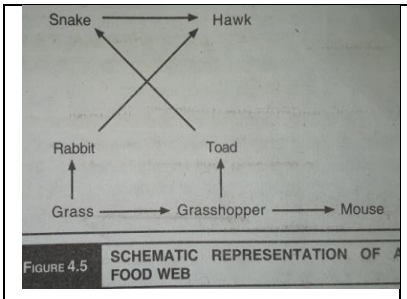


FIGURE 4.5 SCHEMATIC REPRESENTATION OF A FOOD WEB

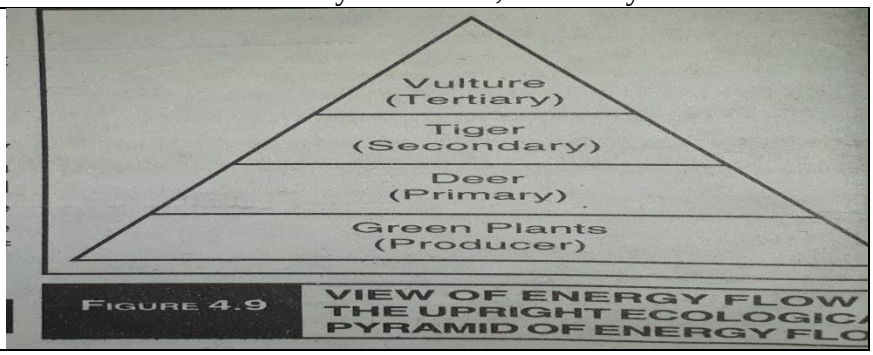


FIGURE 4.9 VIEW OF ENERGY FLOW THE UPRIGHT ECOLOGICA PYRAMID OF ENERGY FLO

ECOLOGICAL PYRAMID

They are diagrammatic representation of data of each tropic level in an ecosystem based on numbers of organisms, biomass of organisms & energy flow.

Types of ecological pyramids	**Note**
1. Pyramid of number	1. Autotrophs no < no of carnivores.
2. Pyramid of biomass	2. Primary & secondary producer's aside from this structure.
3. Pyramid of energy mass.	3. Energy flow based.

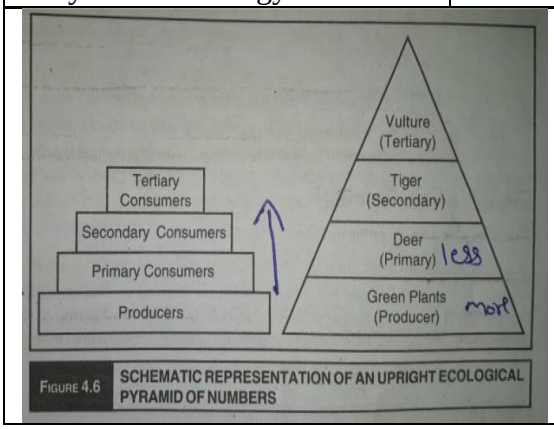


FIGURE 4.6 SCHEMATIC REPRESENTATION OF AN UPRIGHT ECOLOGICAL PYRAMID OF NUMBERS

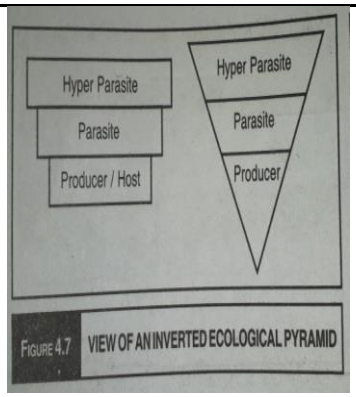


FIGURE 4.7 VIEW OF AN INVERTED ECOLOGICAL PYRAMID

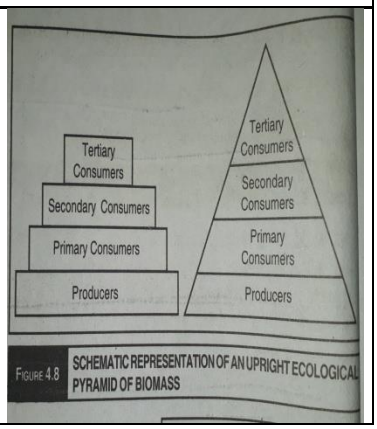


FIGURE 4.8 SCHEMATIC REPRESENTATION OF AN UPRIGHT ECOLOGICAL PYRAMID OF BIOMASS

BIO MAGNIFICATION

1. It occurs when organisms at bottom of food chain concentrate the materials above its concentration in the surrounding soil (or) water.
2. Producer's take nutrients.
3. The problems come up when a pollutant (DDT/Heavy mental present in environment).
4. These chemical pollutants brought into producer's body & stored. This is 1st step of biomagnifications. This is also known as the bioaccumulation.
5. Producer (DDT) – BM – consumer (moved DDT).

Biological concentration factor (BCF).

BCF = Concentration of metal in organism/Concentration of metal in Environment (M).

BIOGEOCHEMICAL CYCLE (OR) BIOSPHERE CYCLE

1. Bio (living organisms) & geo (earth) which can be extended to air & water of the earth & chemical includes the chemical elements & their interaction.
2. Nutrient cycle.
3. Chemicals move in cyclic nature called the biogeochemical cycle.
4. Transport & Transformation of substances in the environment through life, air, sea pond & ice are known as biogeochemical cycles.
5. Global cycles include the circulation of certain elements (or) nutrients upon which life & earth's climate depends.

Types of Biogeochemical cycle

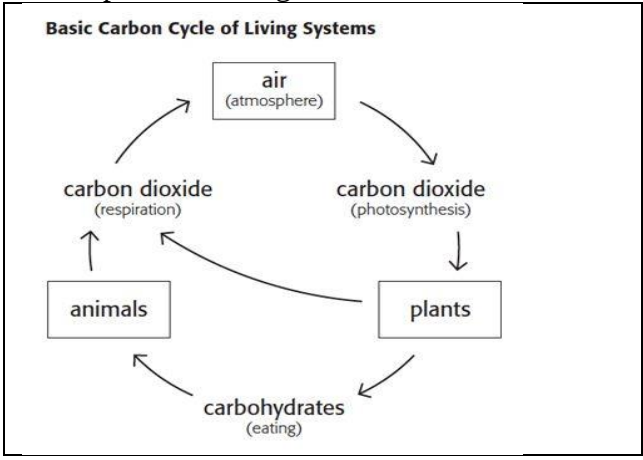
1. Gaseous (Oxygen, carbon, hydrogen, etc). 2. Sedimentary cycle (phosphorous, sulpher etc).

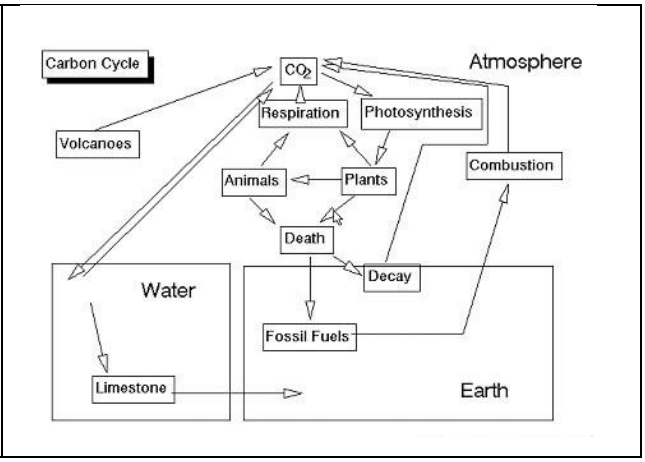
Carbon cycle

Carbon converted – organic molecules – used & released from organism called carbon cycle.

Process (respiration)

Co2 is liberated back to atmosphere from burning of fuel, respiration of biota, volcanoes & decomposition of organic waste.

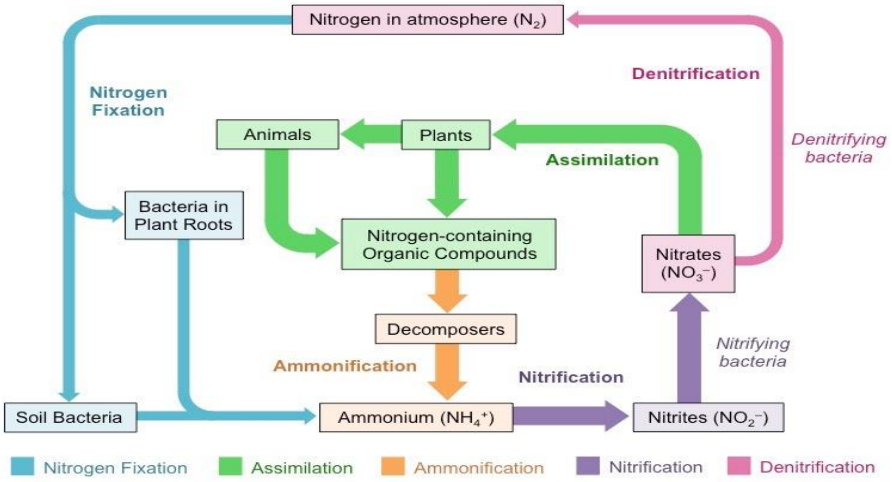


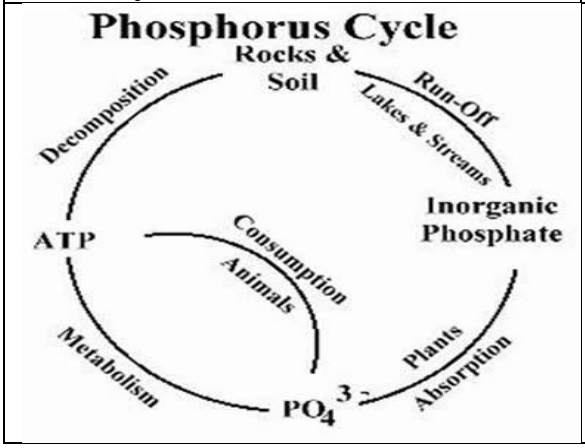
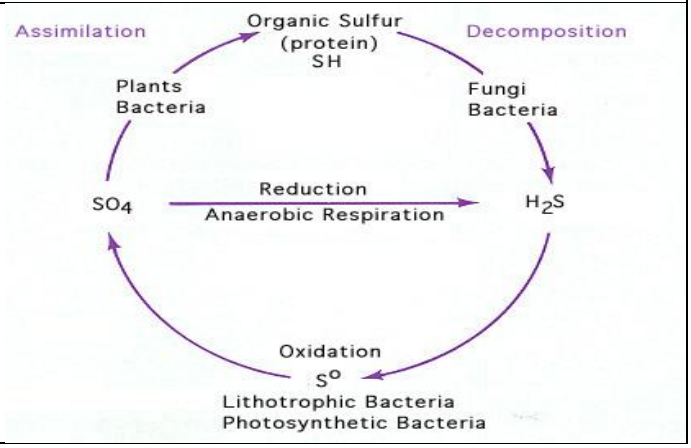


Nitrogen cycle

Present in living bodies & in soil. Plants, animals take nitrate (NO3-) After death

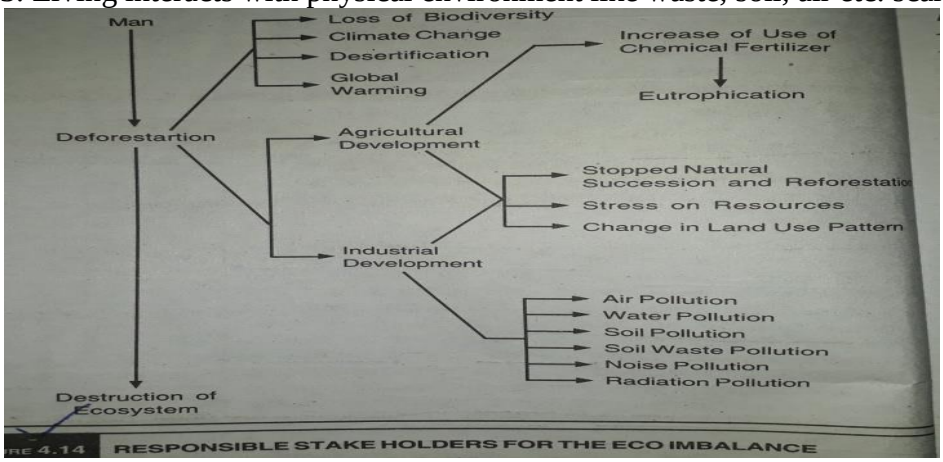
Plants, animals decomposed to ammonia (NH4-) known as ammonification. Ammonium salts (NH4+) are converted to nitrite (No2-) this is called Nitrification.



Phosphorous cycle	**Sulphur cycle**
It is used for the growth of animals, bones & teeth & present in many rocks. After death they mix in soil.	Sulphates used by plants & animals for the production of proteins after their death they will be in soil.
	

ECOLOGICAL BALANCE

1. Due to before station & results in disruption of natural ecosystem –ve environmental impacts.
2. Living interacts with nonliving in the eco system.
3. Living interacts with physical environment like waste, soil, air etc. scare.



Different types of natural eco systems

1	Forest Ecosystem	40% land
2	Desert Ecosystem	17%
3	Tundra Ecosystem/Cold desert.	
4	Marine ecosystem	70% oceans
5	Fresh water pond Ecosystem.	

Marine ecosystem (Four zones)

1	**Littoral**	It is shore line b/w land & open sea.
2	**Neritic**	Region shallow enough to support plants rooted to sea floor.
3	**Pelagic**	It is open sea constituting 90% of total ocean surface.
4	**Benthic**	Bed of ocean

Fresh water (pond) ecosystem

1	**Littoral zone**	Occupied by rooted plants.
2	**Limnetic zone**	Associated organisms are green & blue green algae, fishes, amphibions & larger insects.
3	**Profundal zone**	No light penetrates.

The various components of grassland ecosystem are given below.

Components	Examples
Abiotic Components	
Physical	Temperature, light, humidity, etc.
Inorganic	Water, carbon-dioxide, oxygen, calcium, nitrogen, phosphate, etc.
Organic	Amino acid, humic acid, carbohydrate, protein, etc.
Biotic Components	
Producer	Producers consist of large number of grasses, which are tall from 0.2 m to 3.0 m depending upon the rainfall.
Consumer	
Primary consumer	Herbivorous animals, especially cows, buffaloes, deer, rabbit, mouse, etc.
Secondary Consumer	Carnivorous animals, especially jackals, fox, etc.
Decomposer	Different types of microorganisms and fungi.

Various components of desert ecosystem are given below.

Components	Examples
Abiotic Components	
Physical	Temperature, light, etc.
Inorganic	Different mineral salts, oxygen, nitrogen, carbon dioxide, water, soil.
Organic	Carbohydrate, protein, fat, amino acid.
Biotic Components	
Producer	Producers are shrubs, some grasses, a few trees. Desert plants are usually thorny bushes, water staring succulents and the cacti.
Consumer	The most common animals are reptiles and insects, able to live under exoreic (hot) conditions. Moreover, some nocturnal rodents and birds are found there. The ship of desert, that is, camels feed on different plants of desert.
Decomposer	There are only a few decomposers. Decomposers are some fungi and bacteria, most of which are thermophilic.

The composts of tundra ecosystems are as follow.

Components	Examples
Abiotic Components	
Physical	Temperature, light, humidity, etc.
Inorganic	Carbon-dioxide, oxygen, calcium, nitrogen, phosphate, etc.
Organic	Amino acid, carbohydrate, protein, etc.
Biotic Components	
Producer	Tundra vegetation is in the form of the treeless community. The vegetation consists of lichens, mosses, grasses and willows.
Consumer	
Primary consumer	Usually herbivorous (different birds, etc).
Secondary consumer	Usually fur-beaching carnivores (polar bear, blue fox, etc).
Tertiary	Hawks, wolf, Siberian tiger, etc.
Decomposer	Different types of microorganisms and fungi.

The components of an ocean ecosystem are given below.

Components	Examples
Abiotic Components	
Physical	Water, dissolved oxygen, carbon dioxide, different minerals (form of salts) and up to certain extends of light (photic zone).
Biotic Components	
Producer	Phytoplankton, green red and brown algae.
Consumer	
Primary consumer	Usually herbivorous animals, namely, crustaceous, mollusces, fishes, etc.
Secondary consumer	Usually carnivorous animal. These are small fish like Herring, shad, Mackerel, etc.
Tertiary consumer	Usually carnivorous fishes like cod, haddock, halibut and mammals like whale, sea birds, turtles, etc.
Decomposer	The microorganism and fungi, etc.

The components of fresh water ecosystem are given hereunder.

Components	Examples
Abiotic Components	Water, light dissolved oxygen, carbon dioxide, etc.
Biotic Components	
Producer	Two types of produces are seen in this ecosystem, namely, as follows ■ Micro-phytes - usually different phytoplankton. ■ Macro-phytes - they are partly or completely submerged rooted large plants, some floating plants are also included in this group.
Consumer	
Primary consumer	Zooplankton (amoeba, daphnia, etc), Benthos (snails, small fisher, etc)
Secondary consumer	Frog, fishes, water snakes, etc.
Decomposer	Fungi, bacteria, etc.

Environmental Degradation

INTRODUCTION

It is a progress involving transformation; alteration & material less form any one of the environmental components.

General concept of Environmental pollution

Presence of undersirable substances in any segment of environment due to human activity.

Sources of pollutions

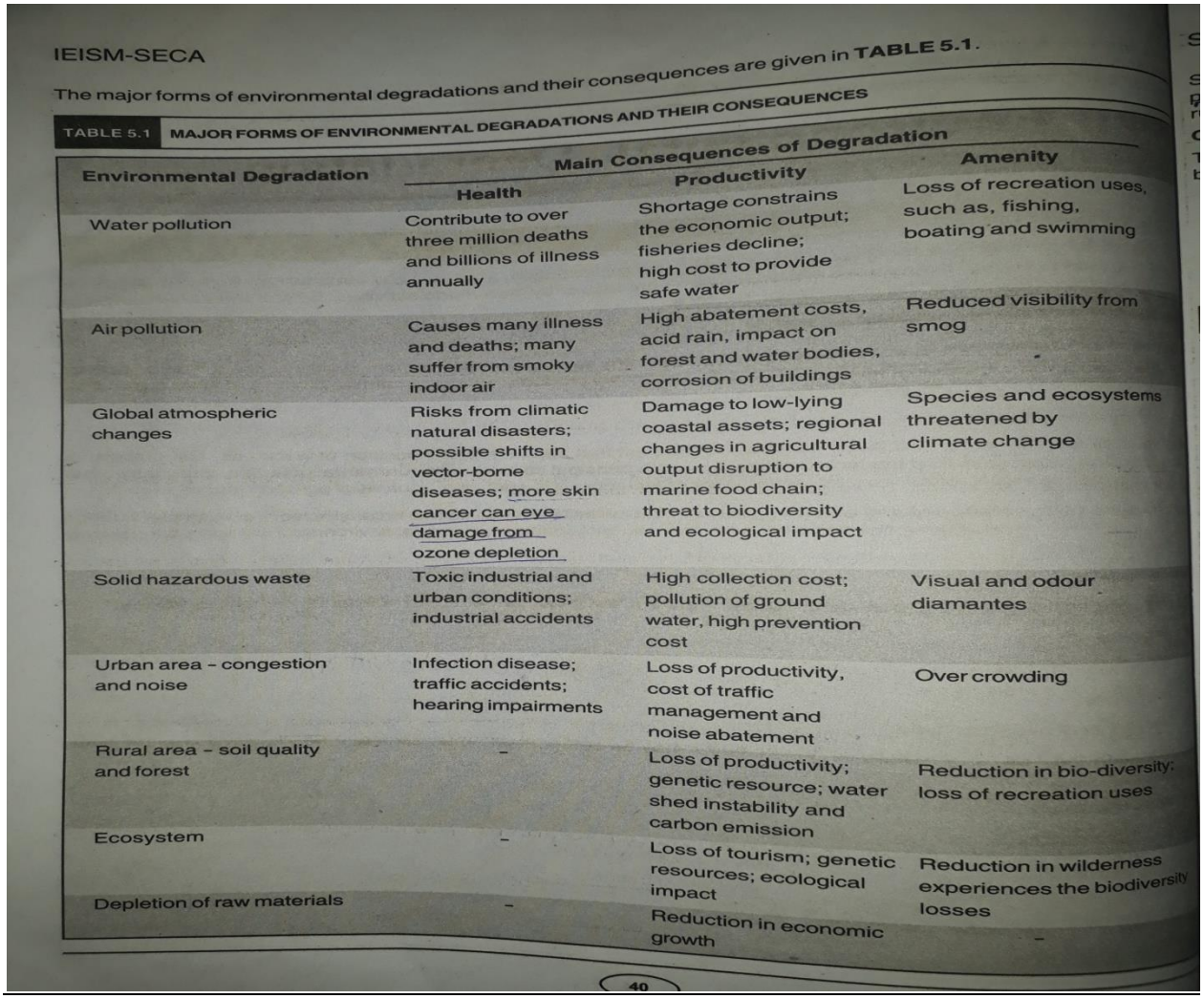
Alter the composition of Air, water, soil etc.

Nature of pollution Categories

Physical	Chemical	Biological	Pollutants of uncertain type.

Nature of pollutants

Water	Soil	Noise
Air or atmospheric	By radioactive substance	Thermal



IEISM-SECA

The major forms of environmental degradations and their consequences are given in **TABLE 5.1**.

TABLE 5.1 MAJOR FORMS OF ENVIRONMENTAL DEGRADATIONS AND THEIR CONSEQUENCES

Environmental Degradation	Main Consequences of Degradation		
	Health	Productivity	Amenity
Water pollution	Contribute to over three million deaths and billions of illness annually	Shortage constrains the economic output; fisheries decline; high cost to provide safe water	Loss of recreation uses, such as, fishing, boating and swimming
Air pollution	Causes many illness and deaths; many suffer from smoky indoor air	High abatement costs, acid rain, impact on forest and water bodies, corrosion of buildings	Reduced visibility from smog
Global atmospheric changes	Risks from climatic natural disasters; possible shifts in vector-borne diseases; more skin cancer can eye damage from ozone depletion	Damage to low-lying coastal assets; regional changes in agricultural output disruption to marine food chain; threat to biodiversity and ecological impact	Species and ecosystems threatened by climate change
Solid hazardous waste	Toxic industrial and urban conditions; industrial accidents	High collection cost; pollution of ground water, high prevention cost	Visual and odour diamantes
Urban area – congestion and noise	Infection disease; traffic accidents; hearing impairments	Loss of productivity, cost of traffic management and noise abatement	Over crowding
Rural area – soil quality and forest	–	Loss of productivity; genetic resource; water shed instability and carbon emission	Reduction in bio-diversity; loss of recreation uses
Ecosystem	–	Loss of tourism; genetic resources; ecological impact	Reduction in wilderness experiences the biodiversity losses
Depletion of raw materials	–	Reduction in economic growth	–

Control of environmental degradation

1. Identification.
2. Waste treatment.
3. Reduction source.
4. Separation & recycling.
5. Waste mgmt economics.

AIR POLLUTION & CONTROL

Pollutants -So2, Now, Co, Ib, Itg.

Contaminants: Human activity. Methyl isocyanate (MIC) Bhopal tragedy pollutant.

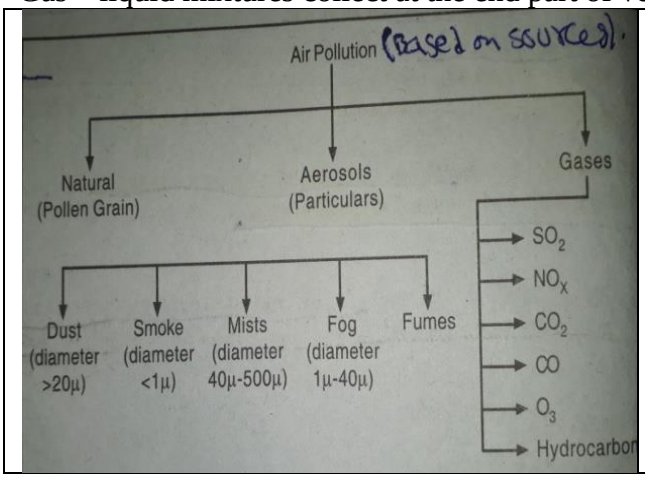
Receptor: Medium affected by pollutant. Ex Photo chemical smog cause eye irritation

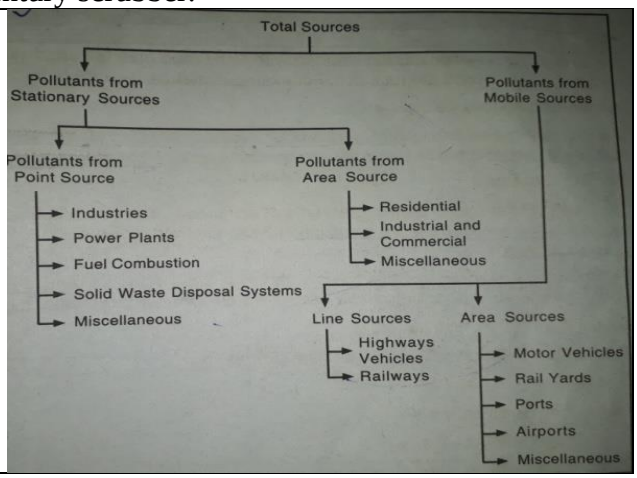
Sink: Medium **interacts with long lived pollutant**. Ex: marble to atmosphere.

Path ways of a pollutant: Pollutant distribution from source into environment segments.

Venture Scrubber: The scrubbling liquid is injected to the inward direction.

Gas – liquid mixtures collect at the end part of ventury scrubber.





GLOBAL ISSUES OF AIR POLLUTION

Global warning, Gradual slow rise in the temperature of the earth due to emission of excess quantities (or) radiation trapping gases is called global warming.

2030AD – 1C – 3C per year, Green house effect – co2, ch4

Impact of global warming

1. Climate (heavy, drought rainfall)
2. Sea water level (raise)
3. Agriculture (cross)
4. Marine food (die due to disturbed condition).

Control of global warming

1. Reduce consumption of fossil fuels.
2. Disposal of green house gases.
3. Recover green house gases.

Smog: Lower layer's of air on being heated move upwards and the fresh & pure air from upper layer comes down.

2 Types of smog

1. Sulphurous smog/Photo chemical/ oxidizing fog + sulphurdioxide London smog So2
2. Nitrogenous smong fog + nitrogenous smog / los angles smog.

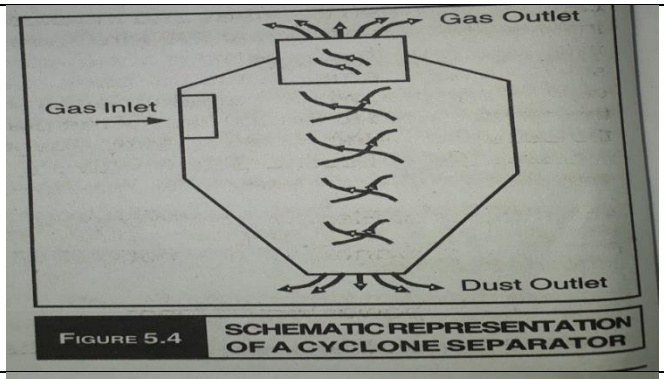
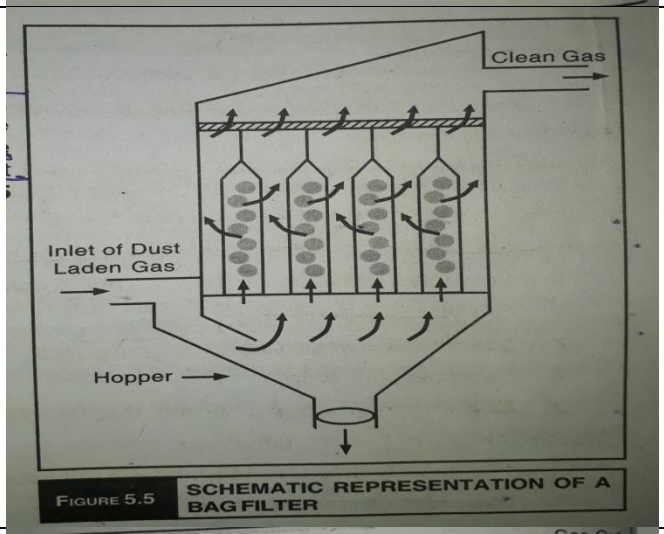
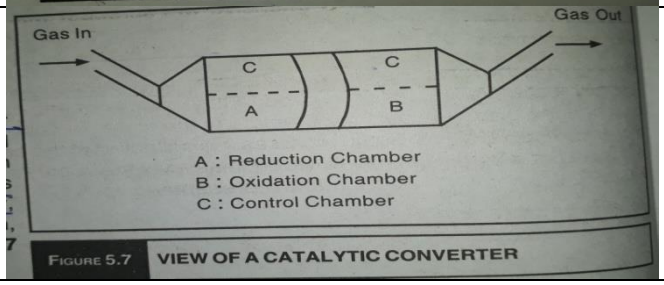
Depletion of ozone layer in atmosphere
UU strikes the stratosphere

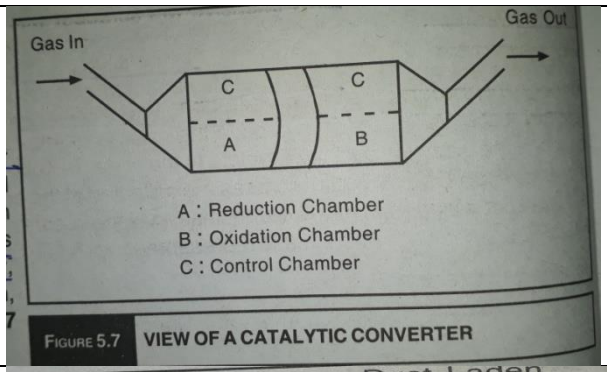
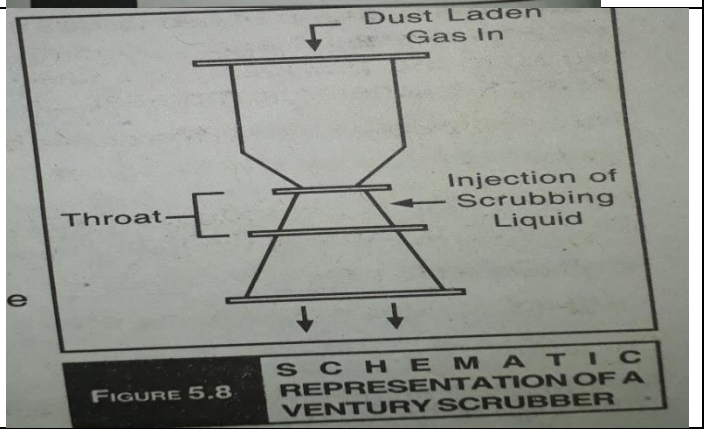
02 + HV – 0 + 0
0 + 02 – 03
Chapman reaction & Chapman layer

Types of CFC effect ozone

Chrofluromethane (CFCI3, CF2CI2)	Fully Halogenated FCC	Hydrochlro fluro carbon (HCFC)
Hydrofluorocarbon	Montreal protocol	Alternative to CFC (Halogented CFC)

Air pollution controlling device

1. Setting chamber	moving stream (gas carrier velocity is reduced) particulates to settle down	
2. Cyclone separator.		 FIGURE 5.4 SCHEMATIC REPRESENTATION OF A CYCLONE SEPARATOR
3. Bag filter.		 FIGURE 5.5 SCHEMATIC REPRESENTATION OF A BAG FILTER
4. Electrostatic precipitator	Depends on charge +Ve & -Ve plates attract.	 FIGURE 5.7 VIEW OF A CATALYTIC CONVERTER

5. Catalytic convertor	Remove 3 harmful components co, volatile organic carbon (voc), Nox this conversion takes place with the help of 2 different types of catalysts namely reduction & oxidation catalyst.	 FIGURE 5.7 VIEW OF A CATALYTIC CONVERTER
6. ventury scrubber		 FIGURE 5.8 SCHEMATIC REPRESENTATION OF A VENTURY SCRUBBER

3 Step's

1. Reduction	2NO – N2 + O2 2NO2 – N2 + O2
2. Oxidation	2(O2 + O2 – 2CO2 2HC + 502 – 4CO2 + 2H2O
3. Control system	Air to fuel ratio is controlled with the help of an oxygen senor.

Speciation
Method of identification of different forms of inorganic & organo – metallic compounds present in the environment. Threshold limits value – pollutant. Pollution standard index

Air Pollutant
1. Primary – directly emitted. 2. Secondary – interaction with 2 more primary pollutants.

Adverse impacts of air pollutant: Co, So2, No2. Deterioration of air quality. Co ,So2,Nox
Particvlatemate: Air – Suspended particulate matter = Irrespirable particulate matter (RPm)

Residual dust (RD)
They are responsible for ENT diseases & long damage. Cadmium, coba 1+, beryllium etc.

WATER POLLUTION & CONTROL
Physical, chemical or biological changes in the quality of water that has harmful effect on living organisms is water pollution.

Water pollution causes

Point sources	Non point sources
1. Factory outlets . 2. Power plant outlets. 3. Underground mines. 4. Oil wells. 5. Sewage treatment plants.	1. Urban street 2. Agricultural lands. 3. Sub-surface flow. 4. Soil erosion. 5. Acid deposition from atmosphere.

Water pollutants

1. Oxygen demanding wastes (ODS) 2. Pathogen
3. Volatile organic command 4. Nutrients
5. Pesticide 6. Thermal pollution. 7. Heavy metals

ODS: They are substances that oxidize in the receiving body of water biological oxygen on demand (BOD), chemical OD.

Pathogen

1. The disease causing organisms usually microorganism that grows & multiples within the host is called the pathogen.
2. Living organisms (bacteria, viruses & protozoa) are infections to human & are responsible for the serious outbreak of total water borne diseases & so they are known as pathogen.
3. Pathogen

a. Macroscopic. b. Microscopic (Small).

4. **Types** a. Bacteria. b. Algae. c. Protozoa.

Nutrients: They are chemicals such as nitrogen, phosphate, carbon, sulphur, catt, kit, fe & co essential for growing of living animals.

Eutrophication

1. Its rate of progress is very slow due to lack of natural supply of nutrient.

Types of Eutrophication	
Natural	**Cultural**
Nutrients are insufficient to produce any significant algal growth so outside supply required.	Increased supply of nutrient through various human activities such as discharge of domestic sewage, industrial waste, agricultural & industrial run-off etc.

Volatile organic compound (UOC)

1. Pollutants in ground water (or) known as suspected carcinogens (or) mutagen
2. a. vinyl chloride. b.Trichlore thylene. c. Tetrachlorethylene. d. Carbon tetrachlorite.

Pesticide

Organic chemicals used to control unwanted species of plants & animals.

1. Herbicide (undesirable weeds) 2. Fungicide (fungi) 3. Insecticide (insects) 4. Rodenticides (rats)	5. Nematicides (nematodes) 6. Molluscides (mollusces) 7. Piscide (Fish & aquatic)

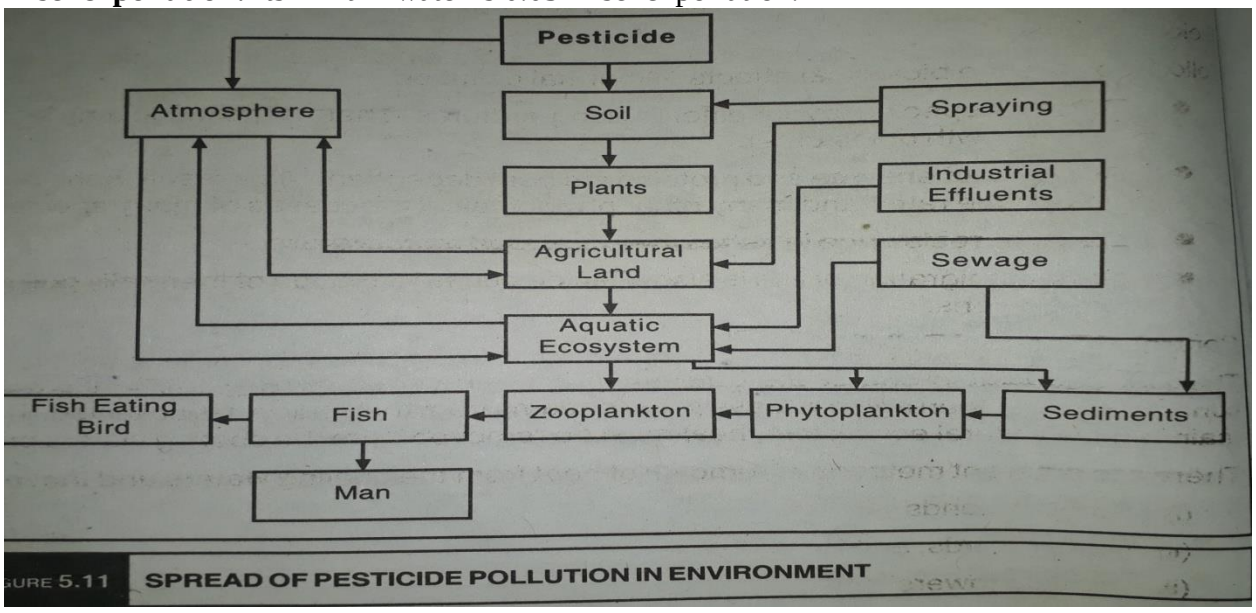
Thermal pollution
Accumulation of unsatable heat from human activities that destroy the natural ecosystem.

Effects of Thermal pollution

Physical effect	Chemical effect	Biological effect
Evaporation rate increase	Concentration of dissolved oxygen reduces	species die

Control of thermal pollution
1. Cooling ponds. 2. Spray ponds. 3. Cooling towers.

Heavy metals: Its density greater than five
Arsenci pollution: Its limit in water is 0.05 Arsenci pollution.



GURE 5.11 SPREAD OF PESTICIDE POLLUTION IN ENVIRONMENT

Biochemical effects of Arsenic

Water quality parameter
1. Physical parameter (Temperature, color, taste, total suspended solid, dissolve solid).
2. Chemical parameter.
3. Radiological parameter.
4. Dissolved oxygen.

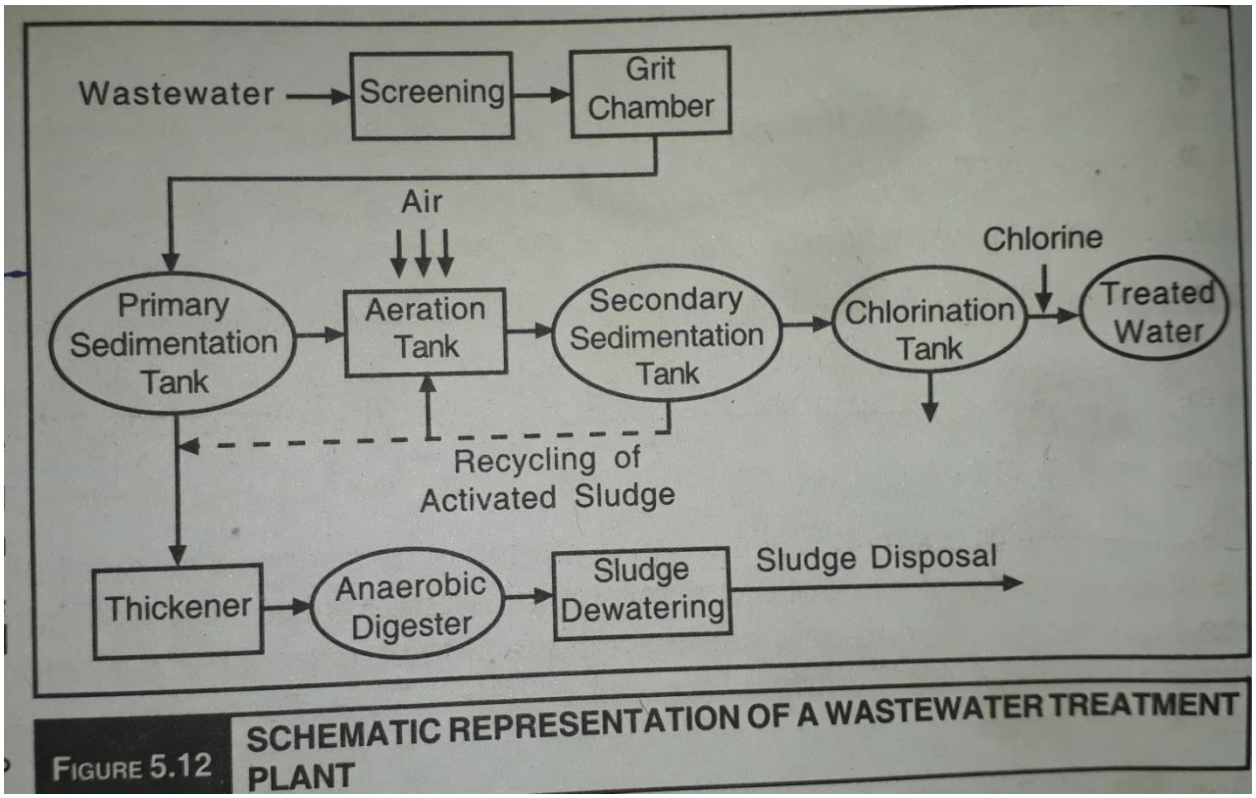


FIGURE 5.12 SCHEMATIC REPRESENTATION OF A WASTEWATER TREATMENT PLANT

Biological Oxygen demand: Relationship between Bod & water quality.

SOIL POLLUTION

Soil = biotic + abiotic components.
It is a mixture of organic matter, minerals & organisms (bacteria, fungi).

Causes of soil pollution

Urban waste (refuse contains garbage, rubbish materials like paper's fibers, plastic glasses, bottles, street, sweepizes, leaves abandoned vehicle parts & discarded products.

Industrial waste: Non biodegradable waste.
Agricultural Waste: Pesticides (chemicals)
Soil conditioner: Increase fertility of soil (lead, cadmium, amercury etc).
Farm house waste: Cows, cattle, pigs, poultries effect soil texture.
Biological Agent (BA): Excreta (animals, birds) major source of soil pollution called B.A.
Effects of soil pollution: Cancers
Control of soil pollution: Biofertilizers

NOISE POLLUTION & ITS CONTROL:

Unwanted sound increase unique sound waves.

Pitch: It is determined by how rapidly the object vibrates.
Frequency (Rate of vibration.): Loudness depends on frequency & amplitude.
Amplitude: It distributes air molecules near the object & set them in vibrations.
Intensity: Source spread outwards pressure vibrations.

Loudness: Strength of sound.
Unit of Noise: Decibel.
Incoherent sound: It relates one sound wave to other.

Source of noise		
Industrial source	**Non industrial**	
Transportation sounds vehicular	1. Loud speakers 2. Construction 3. Road traffic 4. Trains	5. Aircraft 6. Satillites 7. Blasting unit

Structure of ear

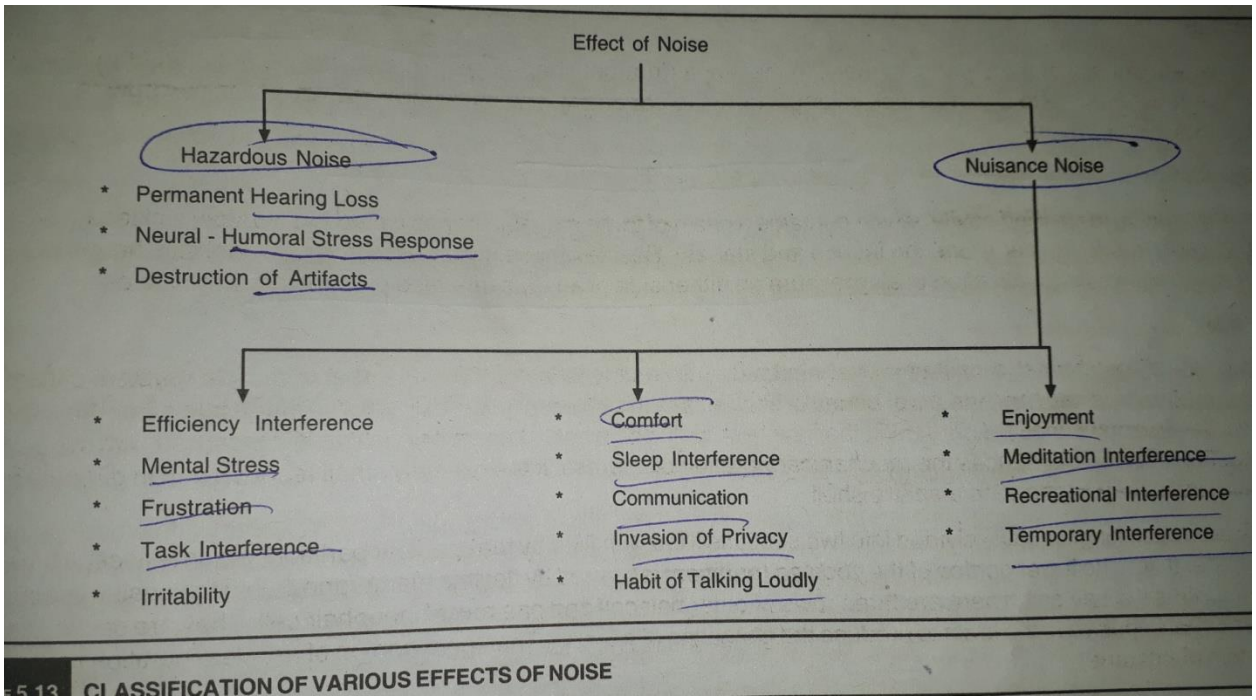
Outer ear – fleshy	Middle ear	Inner ear
	Movable bones (auditory sickles)	Fluid filled cavities.

Effects of noise

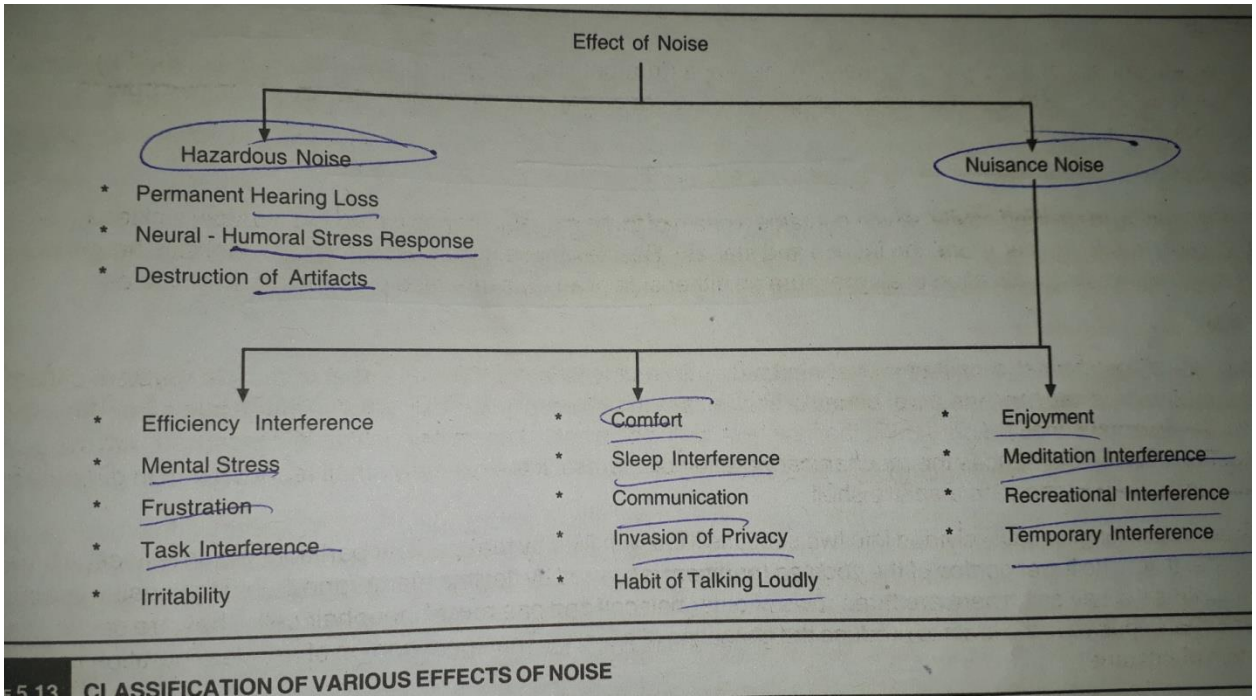
Audio logical level	**Biological level**	**Behavioral level**
hearing problem	body functioning	performance, physiologic & psychology

Repeated Inference with sleep: Mental disorder. Source – paths – receiver
Sound Absorbing material: Insulation, Noise control at receiver.

Position	Intensity of Sound, dB	
	At Night Time	At Day Time
Close to hospitals	40 dB	50 dB
Close to residential areas	45 dB	50 dB
Close to commercial areas	55 dB	65 dB
Close to industrial areas	65 dB	75 dB



5.13 CLASSIFICATION OF VARIOUS EFFECTS OF NOISE



5.13 CLASSIFICATION OF VARIOUS EFFECTS OF NOISE

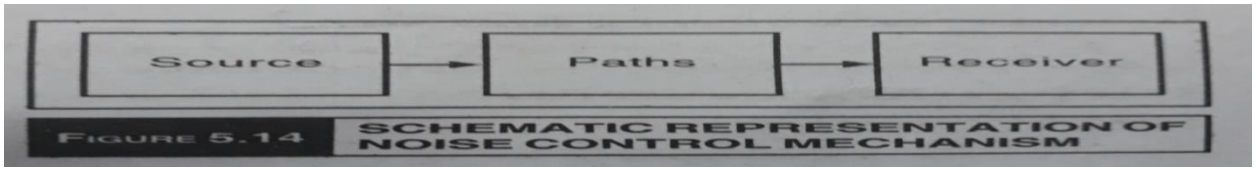


FIGURE 5.14 SCHEMATIC REPRESENTATION OF NOISE CONTROL MECHANISM

Waste management

INTRODUCTION

Government has to dispose the waste write something regarding waste
Hazardous – industrial activities.
Non Hazardous – non Industrial wastes.

TYPES AND SOURCES OF SOLID WASTES

Solid wastes (manmade activities).

Solid wastes classification

1. Garbage

Produced during the preparation of storage meat, fruit, vegetables etc are called garbage & are biodegradable in nature.

2. Rubbish

Non-biodegradable may be combustible (or) non-combustible.
Combustible wastes – paper, wood, scrap, rubber, leather etc.

3. Agricultural waste (Aw)

Crop residue & animal manure are AW(rural people fuels).

4. Pathological waste

Hospital & nursing home waste dead animals, humans, glass & metallic items. Considered as pathological waste (or) bio medical waste (or) nunicipal solid waste
Waste – industrial sector's – industrial solid waste.
Solid waste.
Hazardous solid waste (HSW) – Non Hazardous solid waste (NHSW).

Sources of solid waste

1. Domestic Area.
2. Commercial area.
3. Industrial area.
4. Agricultural area.
5. Hospitals.

PUBLIC HEALTH & SOLID WASTE

1. Solid waste relates to human diseases.
2. Solid waste is health hazard it causes damage to environment.
3. Bacillary, dysentery, amoebic dysentery & diarrhea diseases.
4. Improper disposal of such waste has resulted in death of humans & animals through contamination of crop's (or) water supply.

Solid waste collection

It is from community storage points. Bin's, nearest storage bin, dumping site

Transportation

1. No single transportation can be considered to be effective.
2. Various types of vehicles.
3. Old hard cart.

Various solid waste collection & transportation equipments.

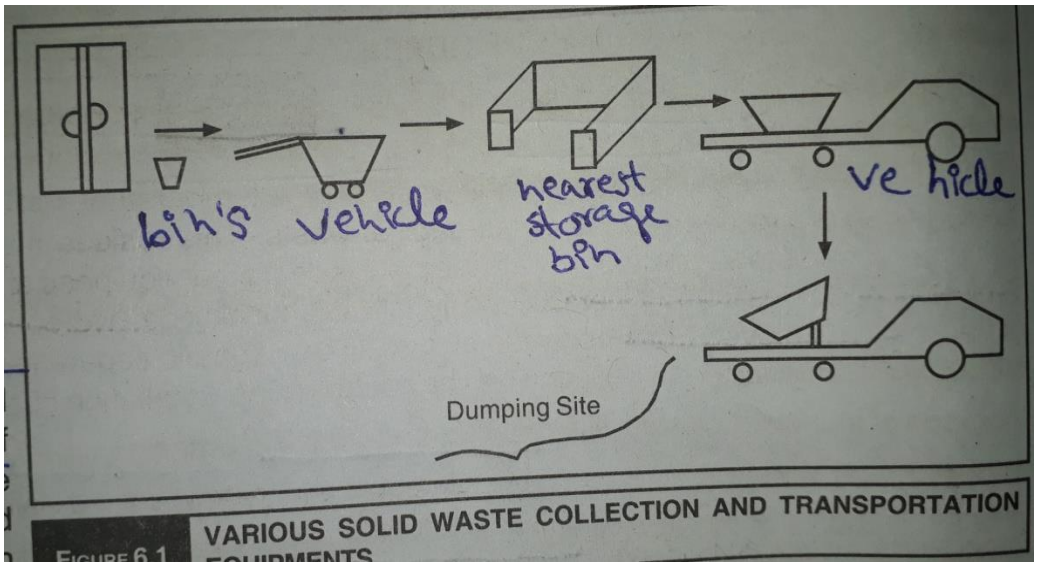


FIGURE 6.1 VARIOUS SOLID WASTE COLLECTION AND TRANSPORTATION EQUIPMENTS

DISPOSAL METHODS OF NON-HAZARDOUS SOLID WASTE

1. Open dumping.
2. Sanitary dumping.
3. Incineration dumping.
4. Composting.

Open dumping

Outskirts of towns & cities they cause public health problems & burnt.

Sanitary land filling

1. Area % layer's = cells
2. Waste sprayed & compacted in layer's called cell.
3. Cell depth = 2m.
4. Cell cover = 20 cm thick.

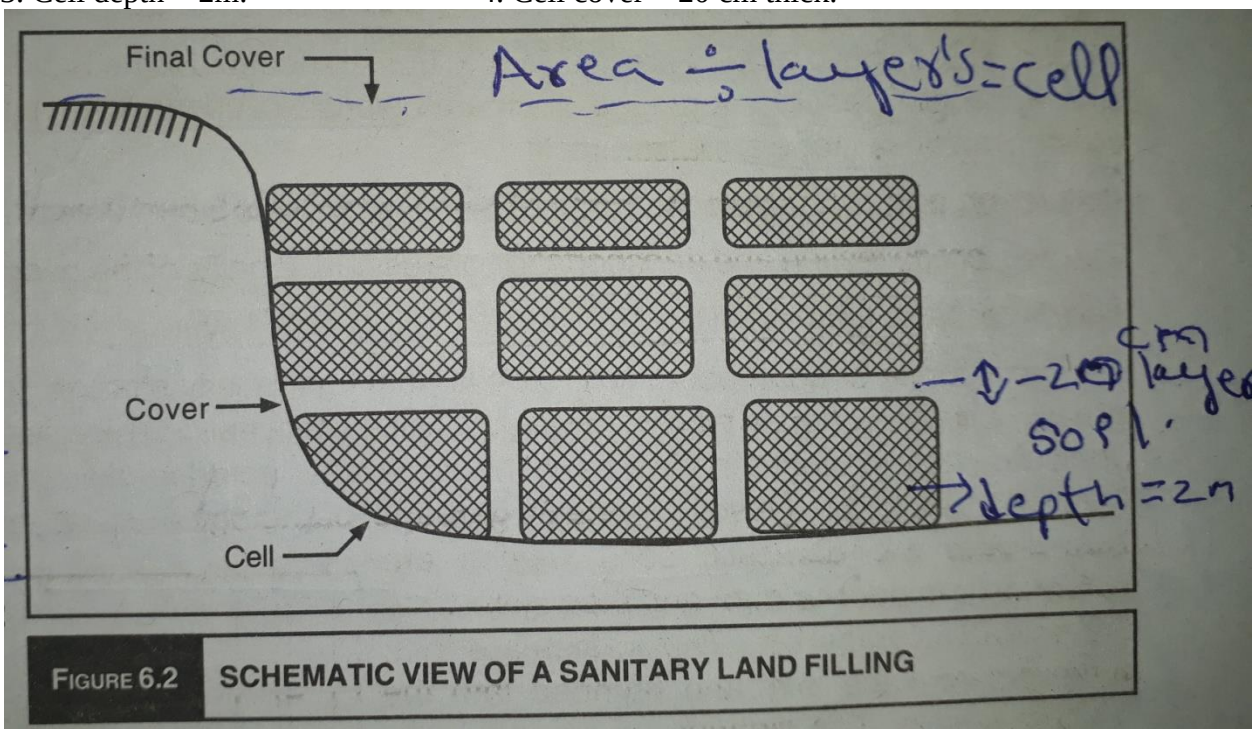


FIGURE 6.2 SCHEMATIC VIEW OF A SANITARY LAND FILLING

Incineration (Burning)
Burning at high temperature (solid waste)

Composting
Types of micro organisms decompose the waste.

REUSE – RECYCLE RECOVERY (3R PRINCIPLE OF WASTE MANAGEMENT :
Waste converted to wealth with 3R principle.
1. Reuse 2. Recycle 3. Recovery.

Waste / solid / liquid Input (IN) – processing – product (PN) Waste (WN)

6 conditions waste to wealth

1st condition
Waste reuse
Input – processing – product
Treatment

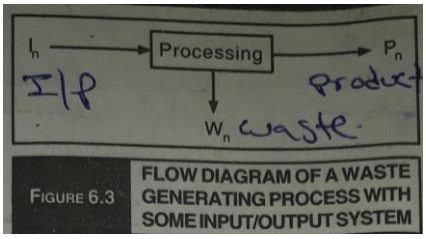


FIGURE 6.3 FLOW DIAGRAM OF A WASTE GENERATING PROCESS WITH SOME INPUT/OUTPUT SYSTEM

2nd condition
waste recycled
Input – processing – waste wan

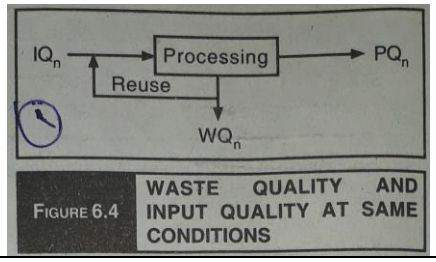


FIGURE 6.4 WASTE QUALITY AND INPUT QUALITY AT SAME CONDITIONS

3rd condition
Reuse in other system
I/P – processing – p
Waste Processing – P

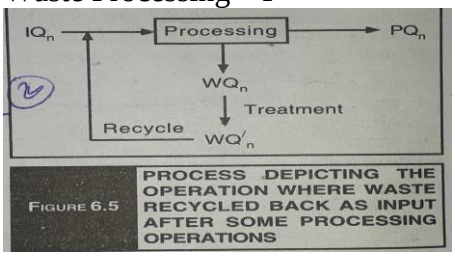


FIGURE 6.5 PROCESS DEPICTING THE OPERATION WHERE WASTE RECYCLED BACK AS INPUT AFTER SOME PROCESSING OPERATIONS

4th condition
converted to new product
I/P – processing – P
Waste treatment

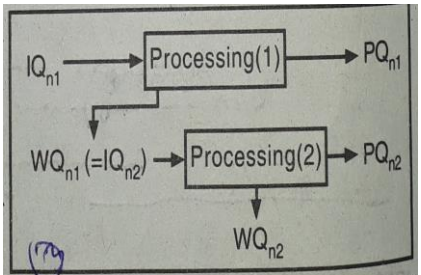


FIGURE 6.6 PROCESS DEPICTING THE SYSTEM WHERE THE WASTE QUALITY BEING USED AS THE INPUT FOR OTHER SYSTEM

5th condition (Recycled in other stage)
I/P – processing – processing – p
Recycle – waste

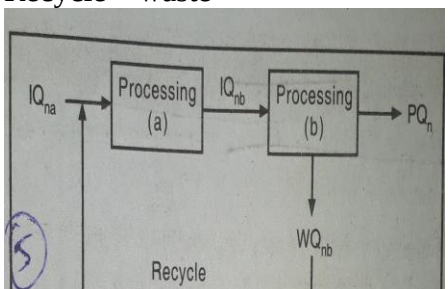


FIGURE 6.8 PROCESS DEPICTING THE FLOWSHEET FOR A SYSTEM WHERE WASTE GENERATED THROUGH ONE STAGE BEING USED BY ANOTHER STAGE

6th condition
I/P – processing – p
Waste wqn – treatment wqn (harmless)

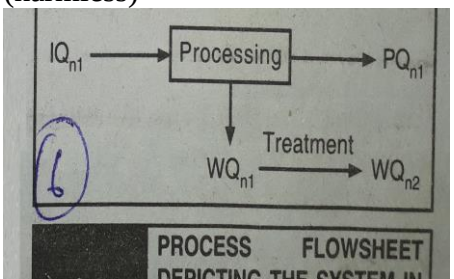


FIGURE 6.9 PROCESS FLOWSHEET DEPICTING THE SYSTEM IN WHICH WASTE GENERATED FROM ONE SYSTEM CONVERTED TO DIFFERENT WASTES OF VARIED QUALITIES

Recycling of paper
Waste paper –
Removed of grit, sand, clip, plastic, etc. from waste
Separate into different grades
Light unwanted materials flatted off

Heavy unwanted materials drained off
Repelling at hydropulper unit
Screened to remove the undissolve matter
Bitumen dispersal unit for removal of tag
Thickened paper slurry used as a raw material for paper board.

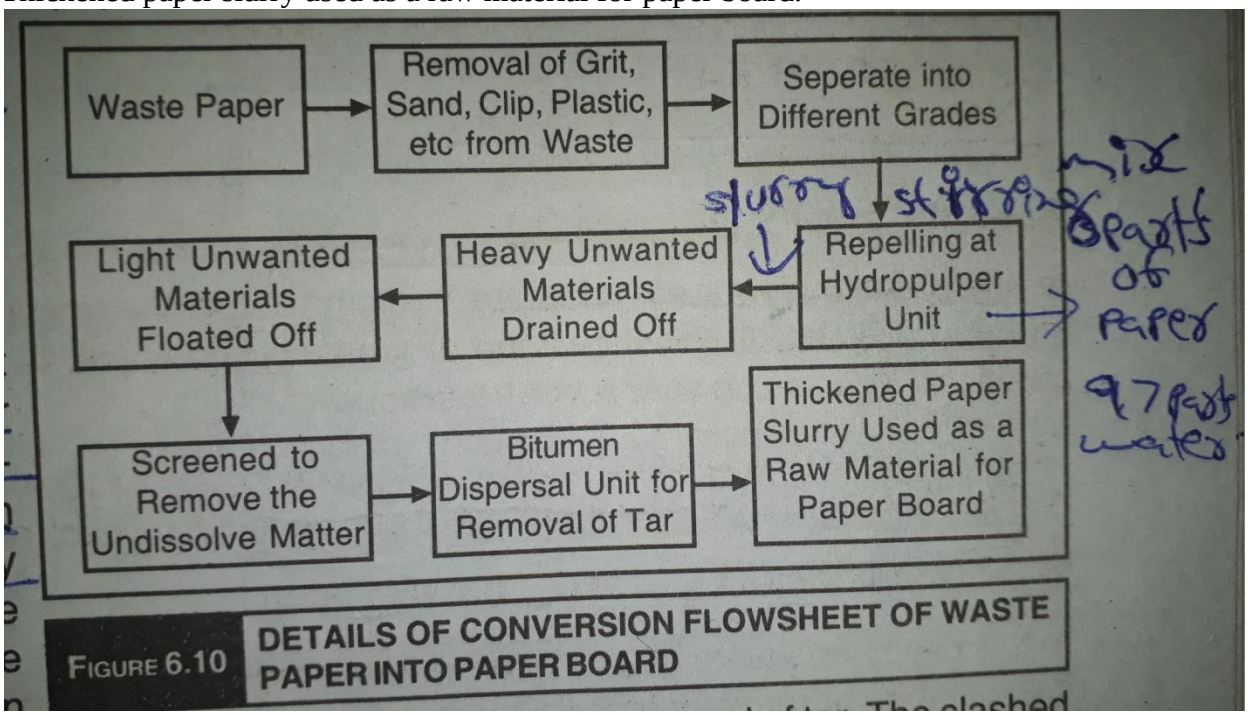


FIGURE 6.10 DETAILS OF CONVERSION FLOWSHEET OF WASTE PAPER INTO PAPER BOARD

Recycling of glass
1. Glass is perfect product of recycling.
2. Cerap glass/eullet can be used in each new batch glass produced.
3. Froth floatation used for glass recycling & it depends on its (glass) surface characteristics.

Recycling of metals
1. Metals recycled from industrial scrap.
2. Metal = ferrous + non ferrous metals.
3. Ferrous & non ferrous separated magnetically.
4. Used to produce alloys in the casting industry.

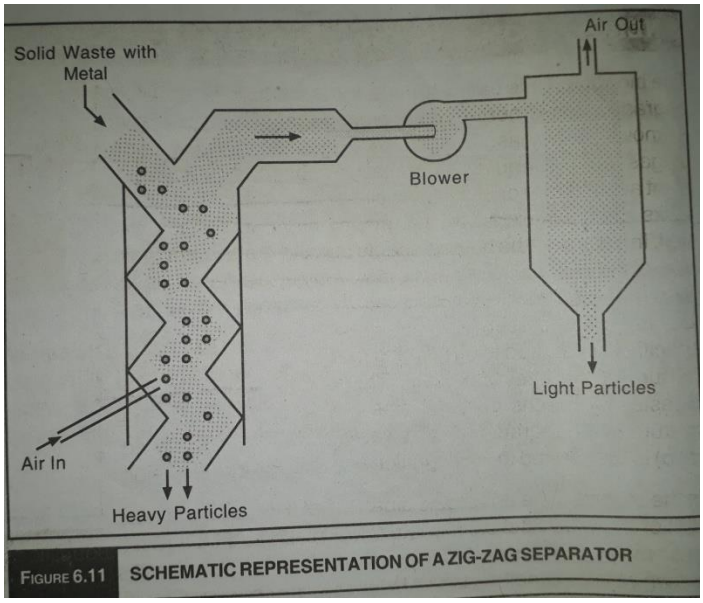


FIGURE 6.11 SCHEMATIC REPRESENTATION OF A ZIG-ZAG SEPARATOR

Recycling of plastic

Plastic = carbon + hydrogen + oxygen not biodegradable.

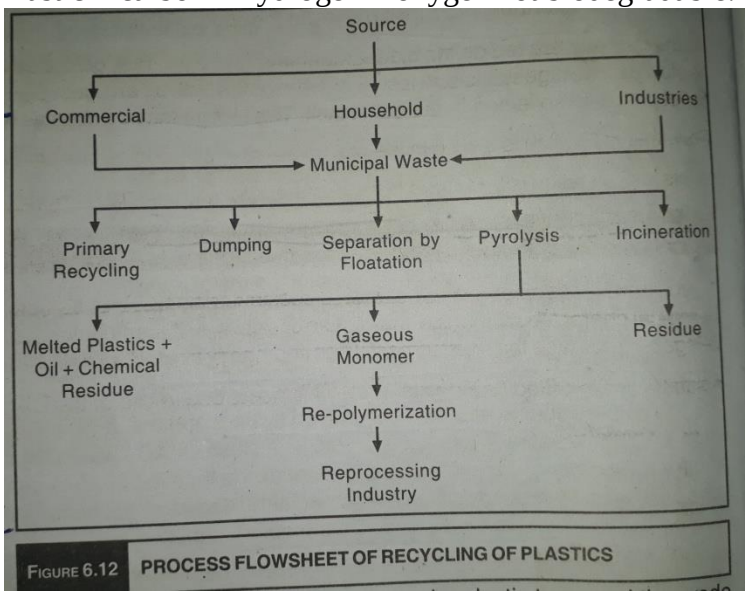


FIGURE 6.12 PROCESS FLOWSHEET OF RECYCLING OF PLASTICS

Types

1. Poly – ole fins. 2. Poly styreme. 3. Poly vinylchloride.

Mixing recycled plastics with the raw plastics during new plastics production.

Other way

Plastic – exposed to UV light – certain chemical group absorbs the light & release energy. Small pieces – plastic looses strength. Mix with soil & decomposed by normal soil bacteria into basic chemicals.

ENERGY FORM MUNICIPAL SOLID WASTE (MSW)

1. MSW = biodegradable part is degraded by micro organism to produce gas (biogas).

2. Components of biogas plant(Digester, Gas holder, 2 tanks).
3. Biodegrable part of MSW and water is mixed is dumped to inlet tank.
4. Micro organisms (gas producing bacteria) are naturally present in the waste.
5. Otherwise bacteria added to the tank for producing methane.
6. In digester the an aerobic digestion of biodegradable part of the municipal solid waste takes place as a result gas methane (Clt 4) produces biogas = clt 4 (55%) + H2 (7.4 %) + co2 (35%) + nitrogen (2.6%). Gas produced moves to storage (gas holder)

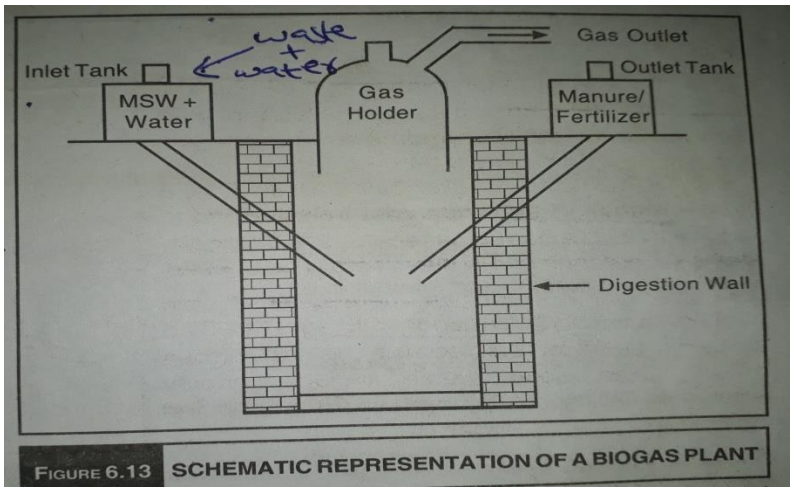


FIGURE 6.13 SCHEMATIC REPRESENTATION OF A BIOGAS PLANT

HAZARDOUS WASTE

A substance is hazardous because of its quantity, concentration, physical, chemical & biological characterics cause mortality (or) irreversible illness to human beings & damage the environment & can be managed by proper treatment & storage.

Criteria for substance to be hazardous if it meets 2 properties

1	**Reactivity**	Violent with water may explosive (or) generate lethal gases.
2	**Ignitability**	Cas fire through friction absorption of moisture.
3	**Corrosively**	Solids, ph < 2 (or) > 12.5 are corrosive waste.
4	**Toxicity**	Substance/combination of substances present in solid waste produces injury / harm to living organism.

Hazardous waste mgmt

1. Identification. 2. Handling.
3. Minimization. 4. Administrative responsibilities.

Identification (Identified based on features)

1. Reactivity. 2. Ignitability. 3. Corrosivity. 4. Toxicity.

Handling: Fire/explosion/infection (or) toxic release vapour/gas – improper

Methods of handling

1. Packing. (Packing required)
2. Labeling: Marking warning of dangerous biological & chemical contamination.

Disposal

1. Land filling. 2. Incineration. 3. Underground injection.

Hazardous waste minimization

1. Eliminate. 2. Reduce. 3. Recycle.

Administrative responsibly to choose

1. Properly marked. 2. Store in separate place.
3. Transport. 4. Treatment. 5. Disposal method.

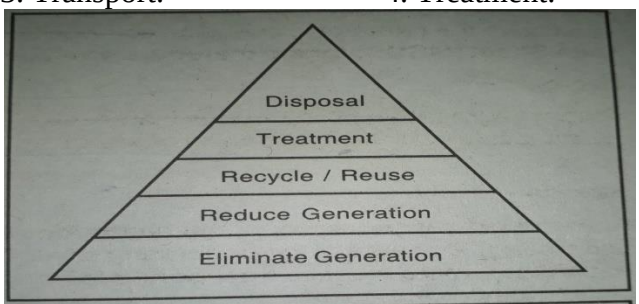
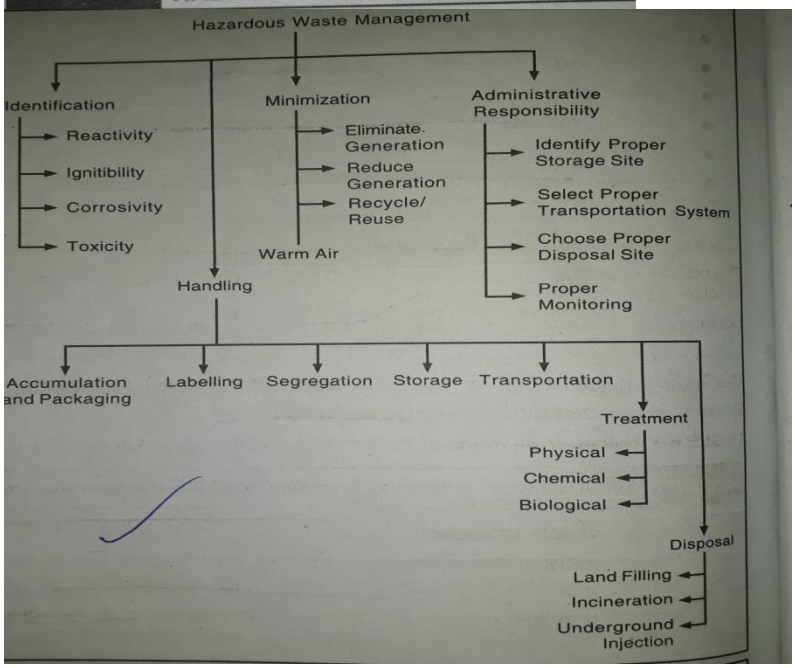


FIGURE 6.14 DEPICTION OF PRIORITIES OF HAZARDOUS WASTE MANAGEMENT



BIOMEDICAL WASTE

IT IS generated during the diagnosis, treatment/immunization of human being (or) animal & differ biomedical research activities.

Identification of sources

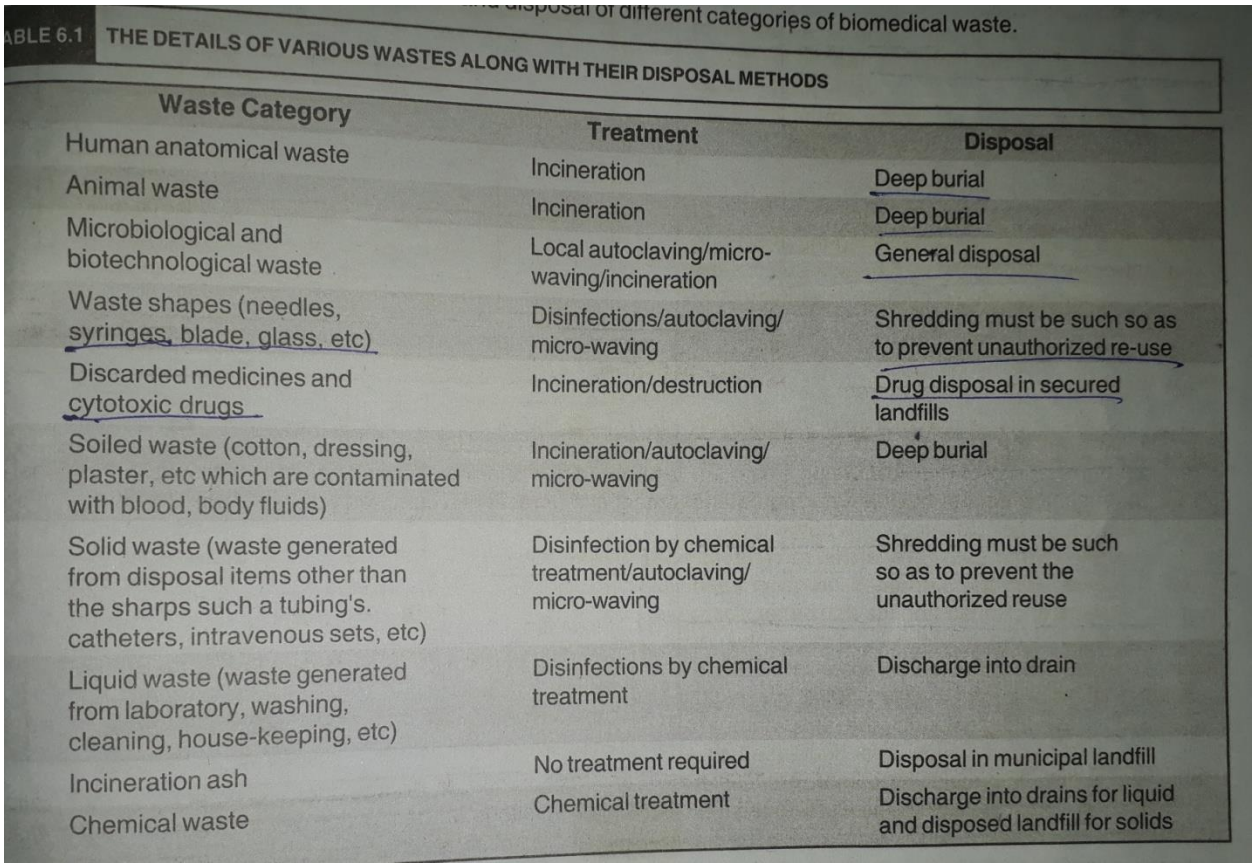
Operation theatre/wards/labor room/opd & physical dangers.

Material safety data sheet (MSDS) should be included.

1. **Segregation**: To avoid chemical reactions.
2. **Storage**: Hazardous storage area, specified time till treatment/disposal.
3. **Transportation**: Special type of vehicles
4. **Treatment**:

a. Physical treatment. b. Chemical treatment. c. Biological treatment. d. Disposal.

Physical treatment: Include gravity separation, phase change system, adsorption etc.
Chemical: Less hazardous /non hazardous, Neutralization, precipitations, oxidation-reduction etc.
Biological treatments: Used to degrade the organic waste present in the hazardous solid waste.
1. Incineration ash. 2. Chemical waste
Treatment: Incineration
Disposal: Deep burial, disposal, discharge into drain.



...disposal of different categories of biomedical waste.

ABLE 6.1 THE DETAILS OF VARIOUS WASTES ALONG WITH THEIR DISPOSAL METHODS

Waste Category	Treatment	Disposal
Human anatomical waste	Incineration	Deep burial
Animal waste	Incineration	Deep burial
Microbiological and biotechnological waste	Local autoclaving/micro-waving/incineration	General disposal
Waste shapes (needles, syringes, blade, glass, etc)	Disinfections/autoclaving/ micro-waving	Shredding must be such so as to prevent unauthorized re-use
Discarded medicines and cytotoxic drugs	Incineration/destruction	Drug disposal in secured landfills
Soiled waste (cotton, dressing, plaster, etc which are contaminated with blood, body fluids)	Incineration/autoclaving/ micro-waving	Deep burial
Solid waste (waste generated from disposal items other than the sharps such a tubing's. catheters, intravenous sets, etc)	Disinfection by chemical treatment/autoclaving/ micro-waving	Shredding must be such so as to prevent the unauthorized reuse
Liquid waste (waste generated from laboratory, washing, cleaning, house-keeping, etc)	Disinfections by chemical treatment	Discharge into drain
Incineration ash	No treatment required	Disposal in municipal landfill
Chemical waste	Chemical treatment	Discharge into drains for liquid and disposed landfill for solids

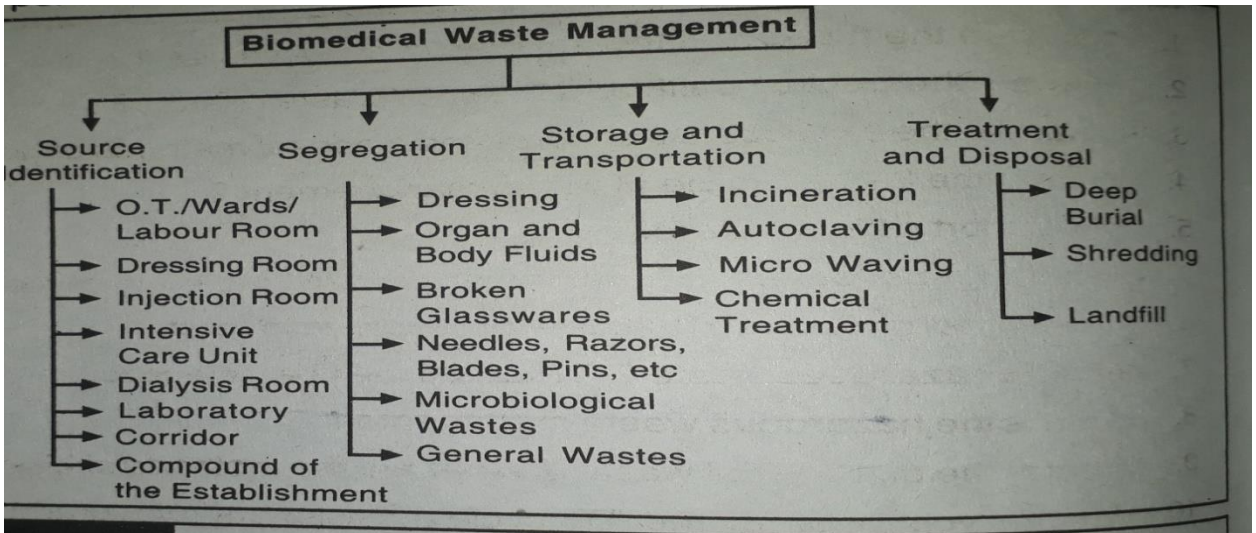


FIGURE 6.16 DEPICTION OF BIOMEDICAL WASTE MANAGEMENT CLASSIFICATION

LIFE CYCLE ASSESSMENT OF A PRODUCT (4 STAGES)

Initiation	Identify types of data needed.
Inventory	Collect data about raw materials needed for I/p's including energy, water & about waste produced as O/P during the process & at the end of life of the product, process, and package.
Impact	Identifying effects on environment, economy & health due to the product/waste generated during the manufacture of product.
Improvement	Reduce (or) mitigate the impacts identified earlier.

1. Dressing room.
2. Injection room.
3. Intensive care room.
4. Dialysis room.
5. Laboratory.
6. Compound establishment.

Segregation of biomedical waste

1. Dressing.
2. Organs & parts, placenta, body fluids etc.
3. Needles, blades, nails, pins, bones etc.
4. Microbiological waste.
5. General waste.

Storage & Transportation of Biomedical waste

1. Plastic bag
2. Vehicles

Waste Category

1. Human anatomical waste.
2. Animal waste.
3. Microbiological & biotechnological.
4. Instruments (blade, syringe, glass etc).
5. Discarded medicines.
6. Cotton, dressing, plaster etc.

6.16 DEPICTION OF BIOMEDICAL WASTE MANAGEMENT CLASSIFICATION

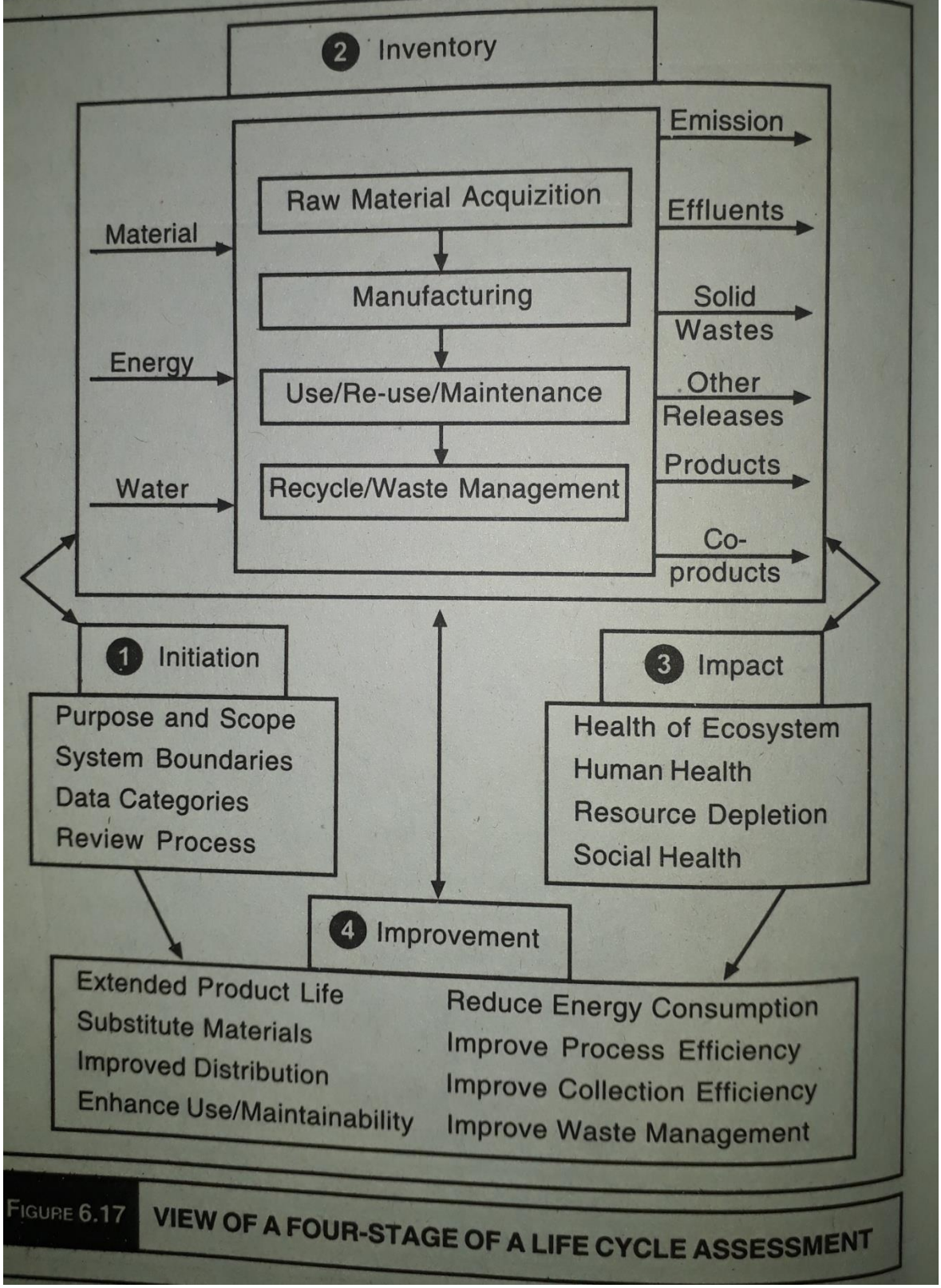


FIGURE 6.17 VIEW OF A FOUR-STAGE OF A LIFE CYCLE ASSESSMENT

SUSTAINABLE DEVELOPMENT

INTRODUCTION

1. It is a process of connected components.
2. Economic social developments are important for development.
3. Effort's achieve economic development have damaged the natural resources, in developed & developing countries.
4. Taking more (use of forestation, wet-lands, overfishing, population growth etc) leaves less for the future. (Disastrous situation leads).
5. Development activities altered nature provides what is needed to present generation/future. Called as sustainable development.
6. Environmental protection forms a component development.
7. Economic development Inter-linked Environmental protection.
8. To attain sustainable development, no of Area's as detailed below, have to be organized.

a. Improve energy efficiencies.
b. Saving forest.
c .Bio diversity.
d. Adopting water resource mgnt.
e. Coastal fisher's mgmt.
f. Arresting pollution.
g. plan cities better.
h. Green revolution.
i. stabling the population.
j. stop environment destructive subsidies.

Sustainable development 3 basic components

1. Economic system.
2. Social system.
3. Environmental system.

Principles of sustainable development

1. Life style improvement.
2. Environment protection.

Life style improvement (Gives dig)

Economic, social systems are Responsible for life style improvement.
Social deals with optional flow of income white maintaining stock of man-made, capital, human capital & natural capital.

Economic system goals

1. Increasing production of goods.
2. Satisfy basic needs.
3. Improving equity.

Economic development part of total development social dimension built on twin principles justice & equity.

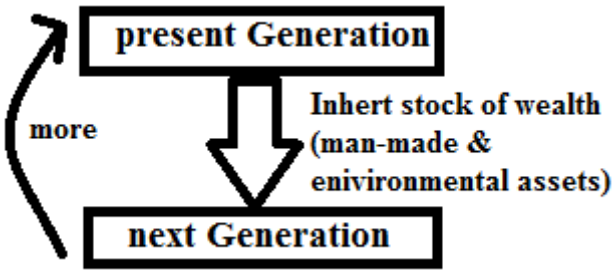
Justice principle

It indicate citizen's should have access to minimum standards of security, human rights & social benefits such as food, health, education, shelter & opportunity of self development.

Environment protection

Human beings depend (directly/indirectly) on environment for their existence. So it is necessary to conserve the quality of environment. Conservation of both natural resources & bio diversity.

RULES OF SUSTAINABLE DEVELOPMENT



Components (Inherited stock) should be man-made assets, natural & human assets.

Interpretations
1st ----------capital, man-made, natural assets.
2nd ----------Natural capital.
3rd ---------- Human capital.
Sustainability defines Man-made capital, Natural capital & Human capital.

SUSTAINABILITY VARIANTS / TYPES	
Weak	**Strong**
Rules (which require that The total capital stock i.e Physical human & natural) Are non-declining through declining Time.	which requires that the nations stock of natural capital is non declining

RENEWABLE ENERGY
1. **World Energy crisis effects**: economy + Environment. Carbon dioxide (Green house gas). Atmosphere global temperature.
2. Deceasing Co2 is the done by use of fossil fuels
3. Fossil fuel based energy resources will operate in which probably.
a. There will be no nuclear power. b. The power will be derived from.

1. Solar energy resources (renewed daily by incoming sunlight).
2. Wind energy resources. 3. Bio energy resources.
4. Geothermal energy resources. 5. Ocean energy resources.
6. Hydro power. 7. Hydrogen energy resources.

Solar Energy (Renewable Energy)
Sum emits power 1000 times more than what we require in the form of radiation.
Solar energy converted directly/indirectly into other forms of energy (heat & electricity which can be utilized by mankind).

Solar Energy Responsibilities
a. maintenance of average surface temperature.
b. creation of currents in the atmosphere and oceans.
c. creation of water cycle.
d. occurrence of photosynthesis in plants.

Draw backs
a. uncertainty of available of solar energy due to clouds, haze, e.t.c
b. Require large spaces for collection of solar energy at a useful rate.

Drawbacks
1st: Incapable of storage. (Believed). 2nd: Dilute form of energy.

Energy storing methods
1. Producing hydrogen & storing it.
2. Storing it in mechanical / electrical devices.
3. Storing it in container's of chemicals called eutectic/phase changing salts.

Energy received from sun of short wave radiations of light, when this radiation strikes a solid/liquid. It gets absorbed & transformed into heat energy. This heat energy is either stored (warming the material) or is conducted to the surrounding materials (air, water, etc) or is re-radiated (in the form of a long wave radiation) to the other materials having relatively over temperature.

Solar energy passes through the glass & is absorbed by some material (black painted surface) Inside it (heat trap).

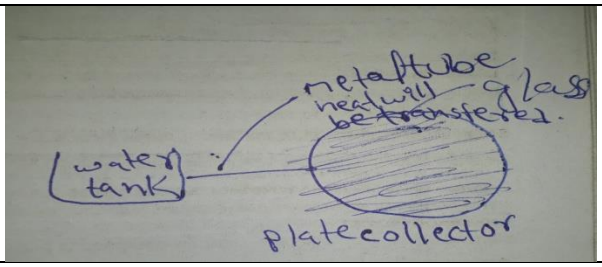
This is the principal for the conversion of solar energy into heat energy.
BHEL universities, public sector institutions universities and research and educational establishments carries research on solar energy.

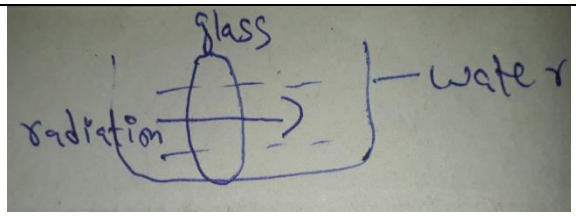
Applications of Solar Energy
1. Solar water heating.
2. Solar Heating of buildings.
3. Solar distillation.
4. Solar pumping.
5. Solar drying of agricultural and animal products.
6. Solar Furnaces.
7. Solar electric power generation.
8. Solar thermal power production.
9. Solar ponds.
10. Solar green houses.

Solar water heating
It comprises a blackened flat plate metal collector with associated metal tubing facing the general direction of the sun.

A pipe to an insulated tank that stores hot water during cloudy day connects the metal tube of the collector. The collector absorbs solar radiations & transfer's the heat to the water. Circulating through the tube either by gravity/by a pump. This hot water is supplied to the storage tank via the associated metal tube used in hotels, guest houses, tourist bungalows, hospitals, canteens as well as domestic & industrial units.

Water tank metaltube Heat transfer through Glass. Collector plate.





Solar Heating of building

1. Solar energy is admitted directly into the building through large south-facing windows.
2. Using separate solar collector's (which may heat either water/air/storage device) that can accumulate the collector solar energy for use at night & during inclement days.

Collectors/storage devices heat building the heat is transferred by conventional equipment such as funs, ducts, air outlets, radiators & hot air/water the collector can be moved to the heat storage device (Insulated water tank/heat retaining material).

Solar Distillation

In coastal areas there is a scarcity of portable water , sunlight is used for converting saline water into portable distilled water by the method of solar distillation

Here solar radiation is passed through a transparent air tight glass cover into a shallow blackened basin containing saline water. Solar radiation passes through the cover's & is absorbed & converted into heat in the blackened surface causing the water to evaporate from the brine (impure saline water). The vapors produced get condensed to from purified water in the cool interior of the roof. The condensed water flows down the sloping roof & is collected in the through placed at the bottom & from there into water storage tank to supply portable distilled water. This method is cheaper than electrical energy based processes.

Solar pumping

The power generated by solar energy is utilized for pumping water for irrigation purposes.

Solar drying of Agricultural & animal products

Agricultural products are dried in a simple cabinet dryer, which consists of a box insulated at the base, painted balck on the inner side & covered with an inclined transparent sheet of glass. At the base & top of top of the sides ventilation holes are provided to facilitate the flow of air over the dying material which is placed on perforated trays inside the cabinet.

Solar Furnaces

1. Here high temperatures are obtained by concentrating the solar radiations onto a specimen using number of helio stats(turntable mirrors) arranged on a sloping surface
2. These are used for studying the ceramics properties at very high temperatures and used for the production of nitric acid & fertilizers from air.

Solar cooking (Wood, cool, kerosene, cooking gas crisis)

A solar cooker is a flat plate box type solar cooker; the solar radiations entering the box are of short wave length.

Solar electric power generation

1. Electric energy / electricity produced directly from solar energy by means of photo voltaic cells.
2. Photo voltaic cell is an energy conversion device which is used to convert photons of sunlight directly into electricity.
3. It is made of semi-conductors which absorb the photons received from the sun, creating free electrons with high energies.
4. A P-N junction of materials which have different electrical properties, usually provides this electric field in photo voltaic cells.
5. Cells arranged in parallel/series combination to form cells modulas.
6. Used for the energization of pump sets irrigation, drinking water supply & for providing electricity in rural area's i.e street light's etc.

Solar Thermal power production

It means conversion of solar energy into electricity through thermal energy

Solar energy-→heat --→liquids gas, water---→mechanical --→turbine -→Electrical.

Heat fluid, gas, any liquid convert into mechanical energy into turbine.

Solar pond

It is utilized (body of water) for collecting & absorbing solar radiation & storing it as heat & it drives turbine.

Solar Green House

It is a structure covered with transparent material (glass/plastic) that acts as a solar collector & utilizes solar radiant energy to grow plants.

Wind energy

The unequal heating of the earth's surface by the sun is responsible for the circulation of air in he atmosphere.
2. Lower density forced upwards by the cooler & denser air flowing in the surrounding resulting in wind.
3. Wind caused by unequal heating of the air (In directed form of solar energy).
4. Solar energy converted Kinetic energy. Kinetic energy Utilized to generate electricity. Wind turbine mechanical energy.
5. Expensive.

Research Institutes carry wind energy research

a. Marine chemicals research, Bhavnagar.
b. National Aeronautical laboratory, Bangalore.
c. Central arid zone research institute (CAZRI), Jodhpur.
d. Madurai wind mill Madurai.

Bio Energy:

1. Green Plant's capture solar energy by process of photo synthesis & convert into organic matter known as biomass.
2. When biomass burned it will generate bio energy(wood, coal, agricultural waste) .
3. wet biomass like cow dung, garbage, pig dung, human excreta, poultry dropping,sewage,car gases e.t.c have anaerobic ally decomposed.
4. Anaerobic ally decomposition of organic materials produces biogas which is a mixture of methane (70%) % carbon dioxide.
5. Growth of bio mass consumes more co2 released during combustion of bio mas besides producing oxygen as a by-product of the photosynthetic process.

Geothermal Energy

1. All the heat stored in the earth's crust as thermal energy constitutes an in exhaustible source of energy termed as geo thermal energy.
2. Hot molten rock called magma in the core of the earth.

Ocean Energy Resources

1. It includes ocean thermal energy conversion (OTEC), tidal energy & wave energy.
2. OTEC plant's convert the solar energy stored as heat in the ocean into electrical energy by making use of this temperature difference.
3. This process based on the thermodynamics principle.
4. Upper layer of sea acts as the heat storage reservoir.

Tidal Energy

Tides formed due to gravitational effects of the sun & moon on the earth. So water level of sea will rise Hall due to gravitation. Rise/fall = tide produce electric power. Know as tidal power.

Wave Energy: Wave generates energy.