Chapter-1

Environmental Education

What is Environmental Education?

- Environmental education is a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions.

What is Environmental Education?
Contd..

The components of environmental education are:

- **Awareness and sensitivity** to the environment and environmental challenges
- **Knowledge and understanding** of the environment and environmental challenges
- **Attitudes** of concern for the environment and motivation to improve or maintain environmental quality
- **Skills** to identify and help resolve environmental challenges
- **Participation** in activities that lead to the resolution of environmental challenges

What is Environmental Education? Contd..

- Environmental education does not advocate a particular viewpoint or course of action. Rather, environmental education teaches individuals how to weigh various sides of an issue through critical thinking and it enhances their own problem-solving and decision-making skills.
- **Environmental Education is More than Information about the Environment**

Environmental Education v/s Environmental Information(EE v/s EI)

- EE increases public awareness and knowledge of environmental issues while EI provides facts or opinions about environmental issues.
- EE does teach individuals critical-thinking while EI does not necessarily teach individuals critical-thinking.
- EE does enhance individuals' problem-solving and decision-making skills while EI does not necessarily enhance individuals' problem-solving and decision-making skills.
- EE does not advocate a particular viewpoint while EI may advocate a particular viewpoint.

Scope of Environmental Education

Environment education not limited to issues of sanitation and health but it is now concerned with **pollution control**, **biodiversity conservation**, **waste management** and **conservation of natural resources**. This requires expert eyes and hence are creating new job opportunities. The opportunities in this field are immense not only for scientists but also for engineers, biologists. There is a good chance of opportunity to find a job in this field as environmental journalists. Environmental science can be applied in the following spheres:

Scope of Environmental Education Contd..

- **Ecosystem Structure and Function**
  The study of ecosystems mainly consists of the study of the processes that link the leaving organism or in other words biotic component to the non-living organism or abiotic component. So for the study of environment we should aware with biotic and abiotic components.

Scope of Environmental Education Contd..

- **Natural Resource Conservation**
  For managing and maintenance of forests which are natural resources and for the maintenance of wildlife forms task under natural resource conservation. It is also a scope of environmental studies.
- **Environmental Pollution Control**
  With the knowledge of environmental science everybody can control the pollution. He/she can handle the waste management and also look for ways to control pollution on the aspect of pollution control.

Scope of Environmental Education Contd..

- **Environmental management**
  There are several independent environmental consultants who are working with Central and State pollution control Board. They offer advice to solve the problems of environment the optimum solution for the upcoming problems. They give direction for controlling pollution due to industrial development. There are several current consultants who are working with government pollution control boards, involved in policy making, pollution control, maintenance of ecological balance.

Scope of Environmental Education Contd..

- **The scope of environmental studies in industry**
  Environmental scientists work towards maintenance of ecological balance, they also work towards conservation of biodiversity and regulation of natural resources as well as on preservation of natural resources. Most of the industries have a separate environmental research and development section. These sections govern the impact that their industry has on the environment. Our environment is being degraded by the rapid industrialization. To combat this menace there is a growing trend towards manufacture of "green" goods and products. So we can say that there is a good scope in the field of industry from environmental studies.

Scope of Environmental Education Contd..

- **Research and development**
  Research and development has tremendous scope due to increment in public awareness regarding the environment. Various universities and governmental organizations offer a scope for such research. These universities conduct research studies in order to develop the methods toward monitoring and controlling the source of environmental pollution. Due to an increasing threat from global warming , many steps are being undertaken for the reduction of greenhouse gases and the adoption of renewable energy resources. They generate awareness now regarding the use of solar energy for variety of purposes. This provide scope of environmental history in the field of research and development.

Scope of Environmental Education Contd..

- **Social Development**
  NGO (nongovernmental organizations)help in creating awareness regarding the protection of the environment and making the masses aware of various environmental issues . They also generate a public opinion in this field. They work towards disseminating information and in bringing about changes in political policies that are personally effect the environment. The social dimension of this profession includes controlling population explosion through organizing advisory awareness camps.

Importance of Environmental Studies

1. Environmental studies helps to maintain ecological balance by providing a basic knowledge of environmental systems and their processes. By giving information regarding the changes that take place due to anthropogenic factors environmentally study helps us.
   It also helps to gain a skill in using techniques to analyze various environmental systems and the effect of human activities on that system.

Importance of Environmental Studies Contd..

2. Environmental studies applies economical methods and concepts to issues of the environment, management, environmental policy analysis. Environmental study includes diverse area such as property rights, economic instruments for pollution control, cost benefit analysis management applications with environmental policy.
3. Concepts from environmentally studied can be applied to the study of agriculture and the design of sustainable production systems.

Importance of Environmental Studies Contd..

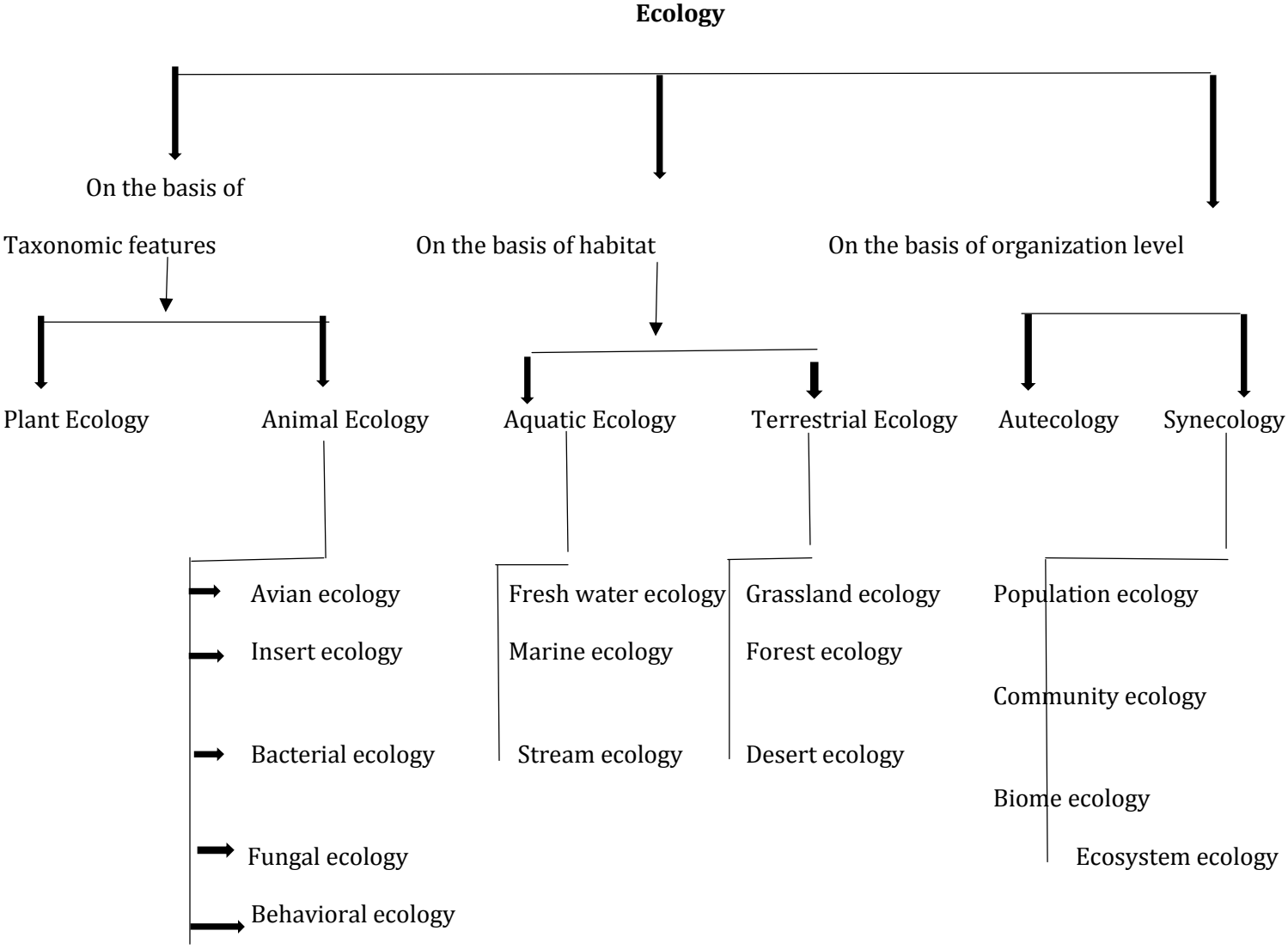
4. We need to a study of physical , biological, chemical and social processes that form the basic of the problem of environment. Environmentally studies provides skills necessary to raise the questions and too often obtain answers to some of the environmental problems from which our planet is facing today.

ENVIRONMENTAL STUDIES

Ecology:-

Ecology is defined as the scientific study of living organisms with each other and with their environment. This word comes from two Greek words oaks (home) and logy (study) [Mean ecology is the study of living organisms in their natural home interacting with their Surroundings] in other words Ecology is defined as the study of interaction of living organisms with their surroundings

Classification of Ecology:-



Ecosystem: - An ecosystem is defined as a natural ecological unit comprising of living organisms and non-living environment that interact to from a stable of supporting system e.g. Pond, desert, grassland, forest, garden etc.

Types of Ecosystem:-

Ecosystems are of two types:-

1. **Natural Ecosystems:** - Their ecosystem are self-operated under natural condition. These are further classified as

(a) Terrestrial ecosystem e.g. desert, forest, grassland etc.

(b) Aquatic ecosystem e.g. river, lake, pond, ocean etc.

2. **Artificial ecosystem: -** These ecosystem are made by human actives (by modification and converted condition in natural ecosystem). These are also further classified as.

(a) Terrestrial ecosystem e.g. crop field, garden etc.

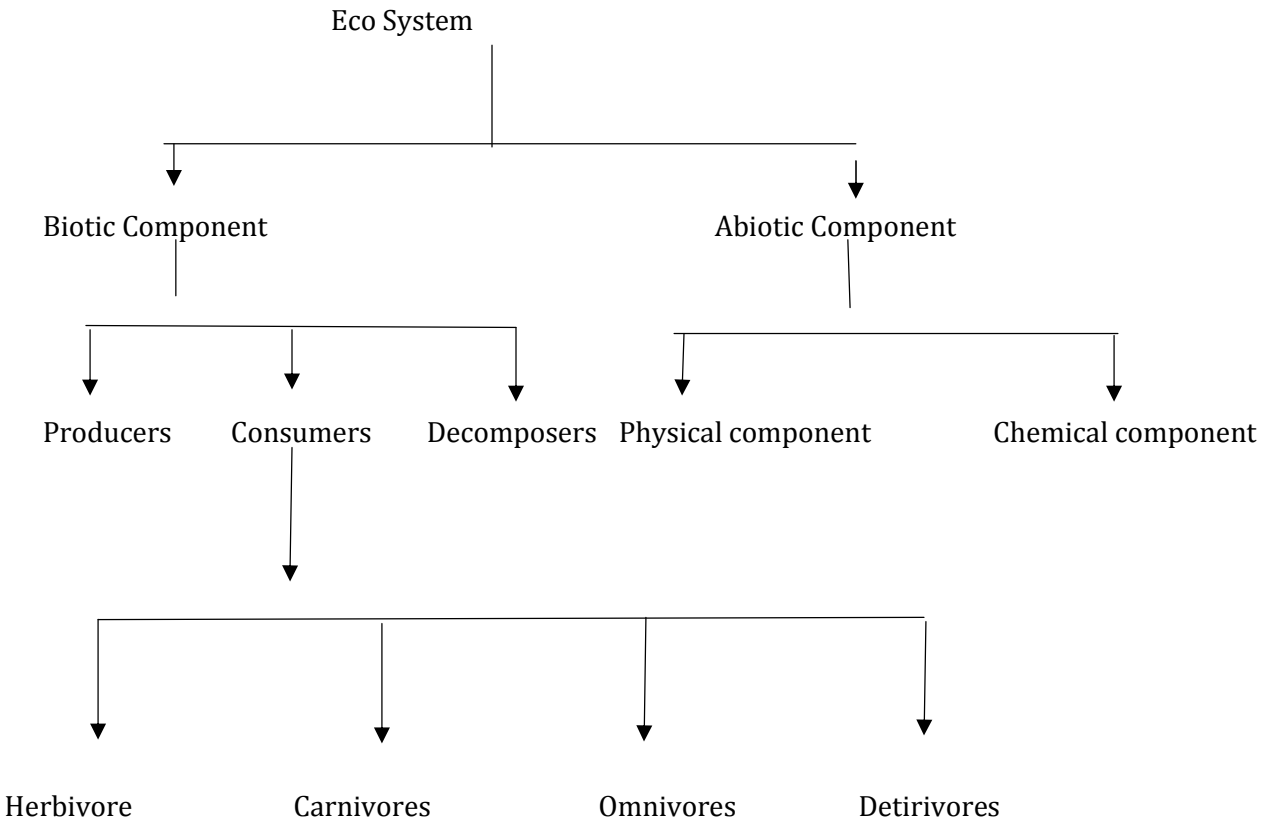
(b) Aquatic ecosystem e. g. aquarium, dam etc.

Structure of on ecosystem. Or

Components of on ecosystem

Basically an ecosystem consists of two main components

1. Biotic component (Living beings)
2. Abiotic component (Non-living components, physical and climate factors)



(iv)**Detritivores:.** Detritivores food on wastes of the living organisms, part of dead organisms and partially decomposed water e.g.

Ants, beetles termites

Biotic component:

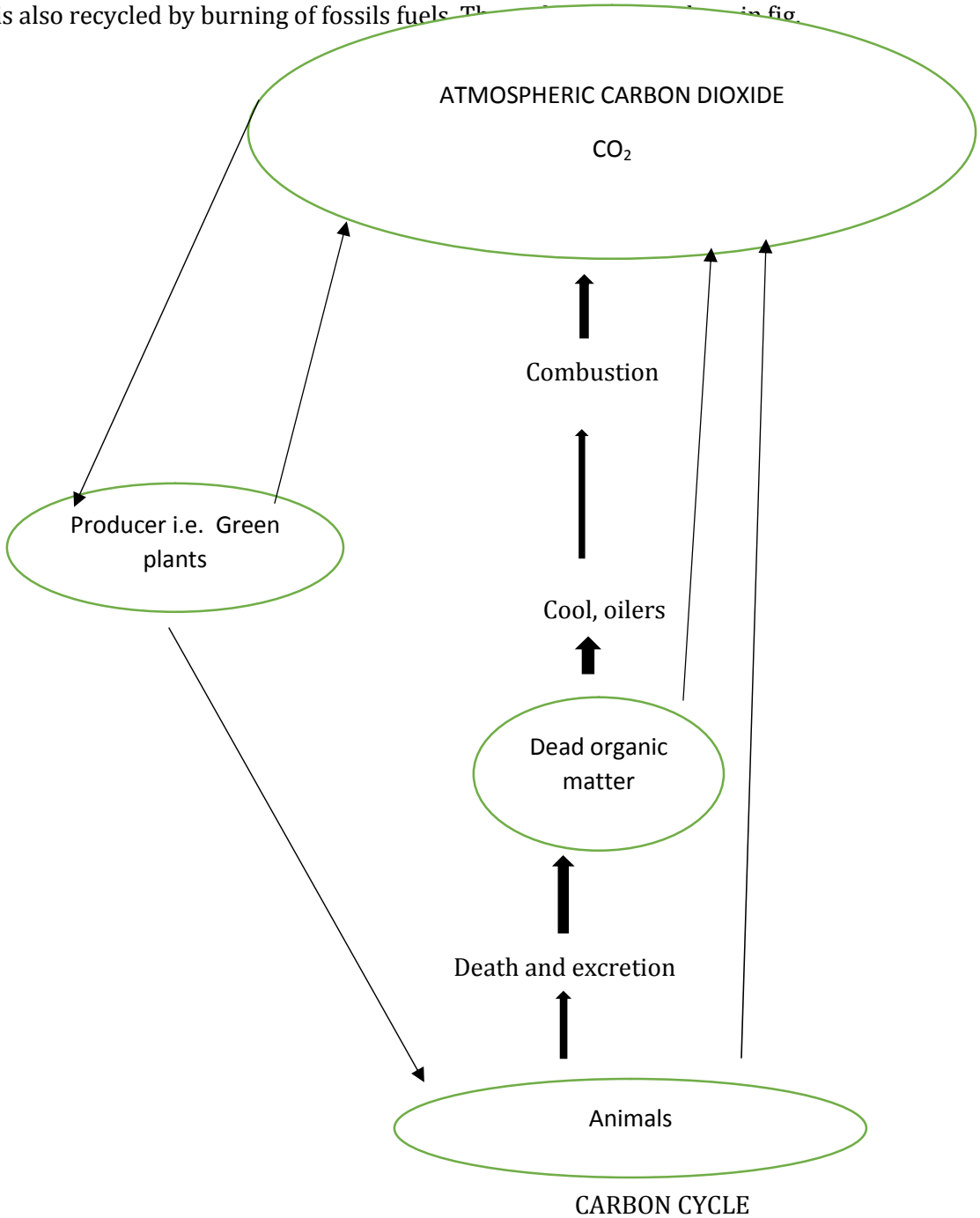
a. **Producers**: These are the generally the green plants, which on synthesize their food with the help of carbon dioxide and water in the presence of sunlight through the process of photo synthesis . These are also called autotrophs.
b. **Consumers:** These are the organisms which depend upon other living organisms for their food. Their also called heterotrophs. Consumers are further divided as follows :
    I. **Herbivores:** These are the organism which directly food on plants. They are also known as primary consumers e.g. rabbit, goat, dear, cattle, etc.
    II. **Carnivores:** .These are the organisms which good on other consumers. The Carnivores which food on herbivores (primary Consumers) are called secondary consumers e.g. frog, cat etc. The converses which food on other carnivores are called tertiary consumers e.g. tiger, Lion etc.
    III. **Omnivores:**These are the organisms which food on both plants and animals e.g. man fox crone bear many birds etc.
c. **Decomposers**: these are the organisms which obtain their feed from dead bodies of producers (plants) and consumer (animals) and their organic wastes. These organisms are also called reducers because they and remove the dead bodies of the organisms. Decomposers are often called micro-consumers
d. **Abiotic Components**:
    a. **Physical Components:** The rainfall temperature, sunlight wind, humidity, soil, water, availability etc. are some of the important Physical component which influence the ecosystem strongly.
    b. **Chemical component:.** The major essential like carbon , hydrogen , nitrogen, phosphors, Sulphur, potassium, various salt and organic substances presents in the water or soil influence the ecosystem to a large extant.

Importance of Ecosystem:Ecosystem are important to human life because they provide a lot of valuable service which include everything from clean air and water to food and fuel ecosystem clean and store fresh water, maintain productivity , store and recycle nutrients ,about noise , maintain biological and genetic diversity , provide recreational opportunities , provide medicine etc.

Characteristics of an Ecosystem:

1. It is a major structural & functional units of ecology
2. The structure of an ecosystem is related to its species diversity. The more compels ecosystem has high species diversity.
3. The relative amount of energy required to maintain an ecosystem depends upon its structure.
4. Ecosystem mature lay passing from less compels to more compete stares.
5. Ecosystem vary size location, weather pattern and types.
6. The boundary of an ecosystem is not fixed because animals may wander from are place to another or seeds may be shifted by wind from our place to another.
7. There is a reciprocity between the living components of the ecosystem.

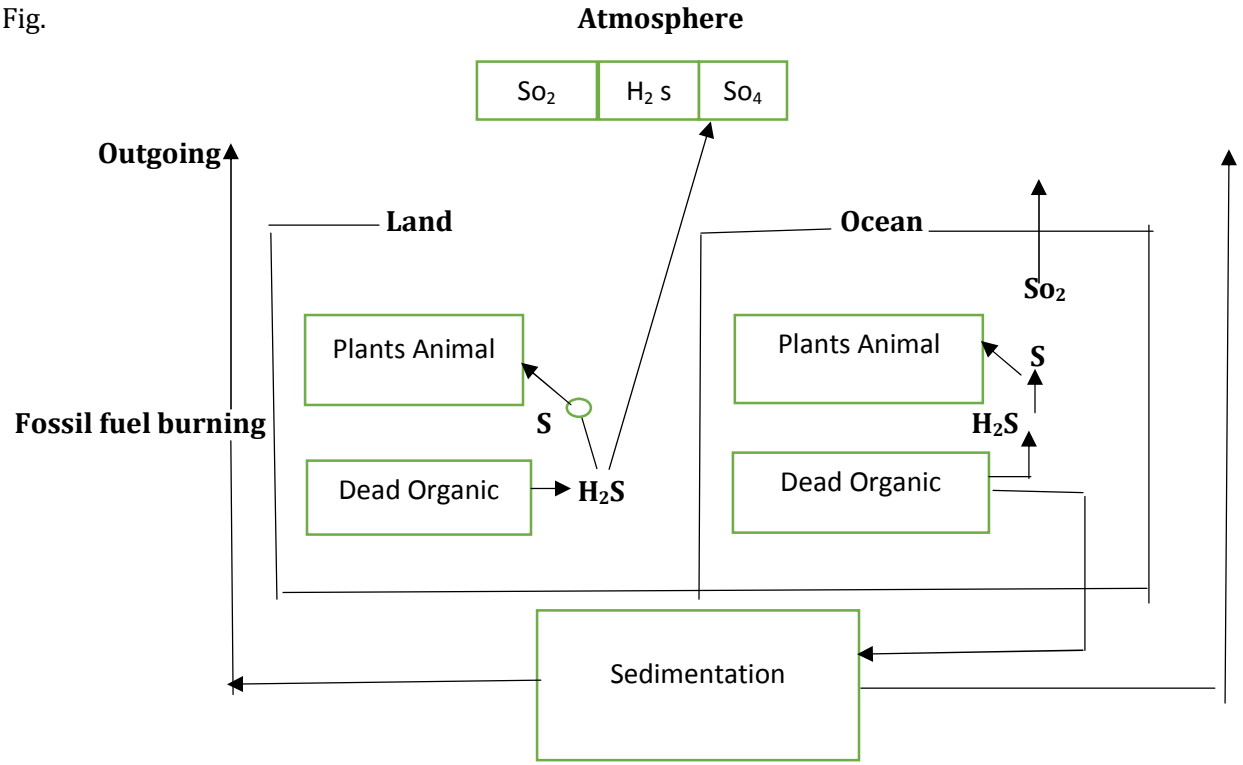
Carbon Cycle:. Carbon cycle is form of the carbon dioxide is taken up by producers (plants) as a raw material for photosynthesis through which a variety of carbohydrates and organic substances are produced. These organic components are than passed to consumers i.e. herbivores & carnivores during respiration, human and animal released carbon dioxide back to the surrounding medium. Further the dead bodies of plants and animals as well as body wastes are DE components by micro- organisms to release carbon dioxide back to the surrounding medium. Carbon is also recycled by burning of fossils fuels. Th[illegible] in fig.



CARBON CYCLE

Sulphur cycle: The decomposition of the organic, sulphurous matter forms hydrogen sulphide. Oxidation of hydrogen sulphide forms sulphates plants consumers the sulphates forming proteins animal's consumers the plants forming proteins. The dead animals and wastes products from sulphurous matter and complete the cycle.

Fig.



SULPHUR CYCLE

Sustainable Development: Sustainable development may be defined or the successful management of resources for development to satisfy the cleaning human needs, while maintaining or enhancing the ability of environment and conserving natural resources

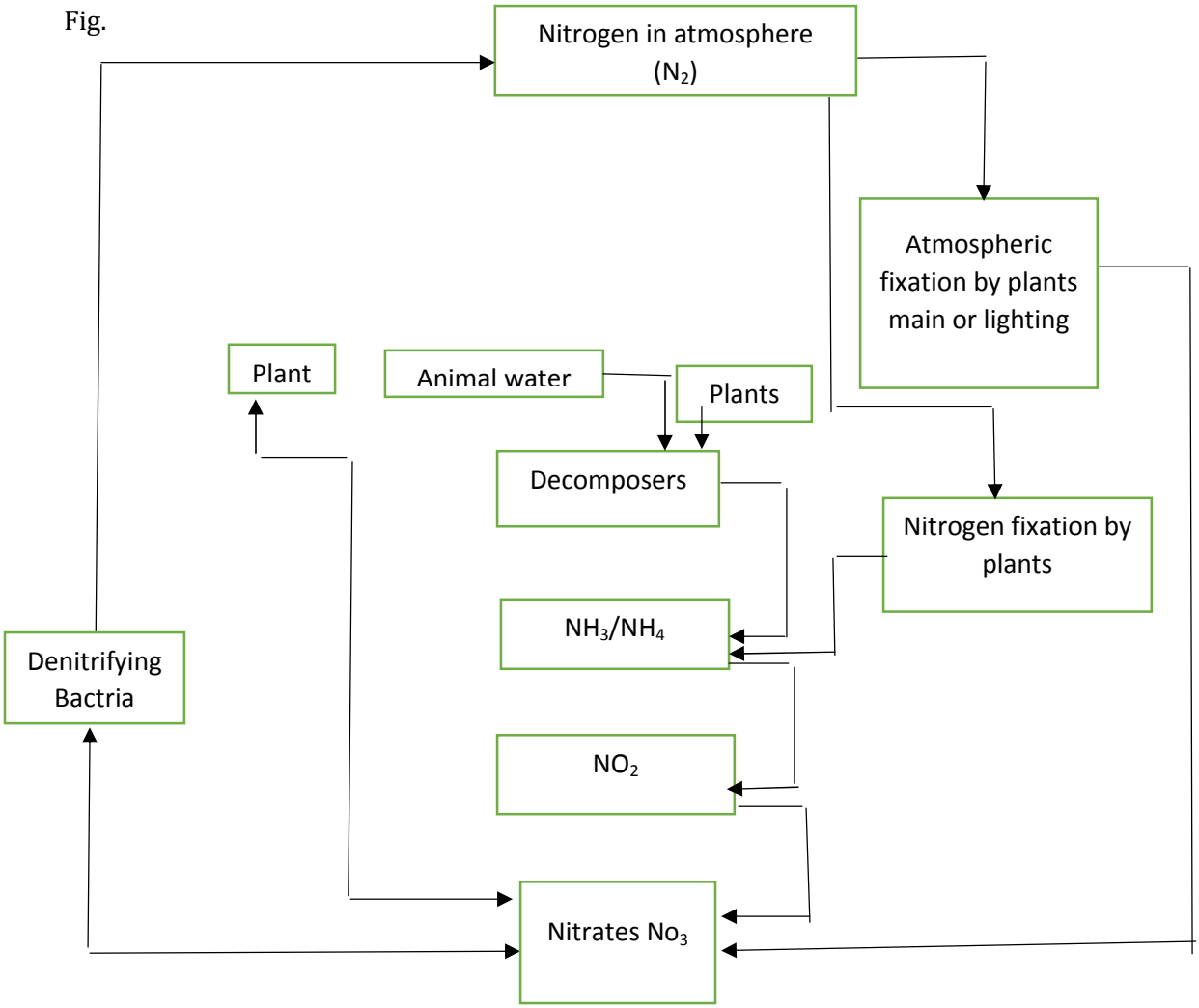
Sustainable development can also be defined as the development that meets the needs of the present without comprising the ability of further generation to meet their own weds this definitionlays these upon two important things.

1. That nature resource are very important to every one of us, but the unborn future generation.
2. That is does not focus only on the present economic growth but take into account the future economic growth stores that we have no right to deny the right to life to future generation. Sustainable development is therefore, a type of development that takes into account the needs of the economic and the environment without compromising either of the aspects.

Nitrogen cycle:. Nitrogen is presents in the atmosphere in large amount (78%) as N_2 It cannot be used as such by living organisms. It has to be fixed to because, usable for green plants. It is fixed either by physical process of lighting or biologically by some bacteria. The decomposition of organic with genius matter forms ammonia and nitrogen. This of process called nitrification. Plants consume these products forming proteins. The wastes product and dead animals also form organic

nitrogenous matter in short, this cycle consists of **(a)**Death of plants forms organic nitrogenous matters**. (b)** Nitrite Nitrogen may be converted to ammonia and nitrogen by denitrification.

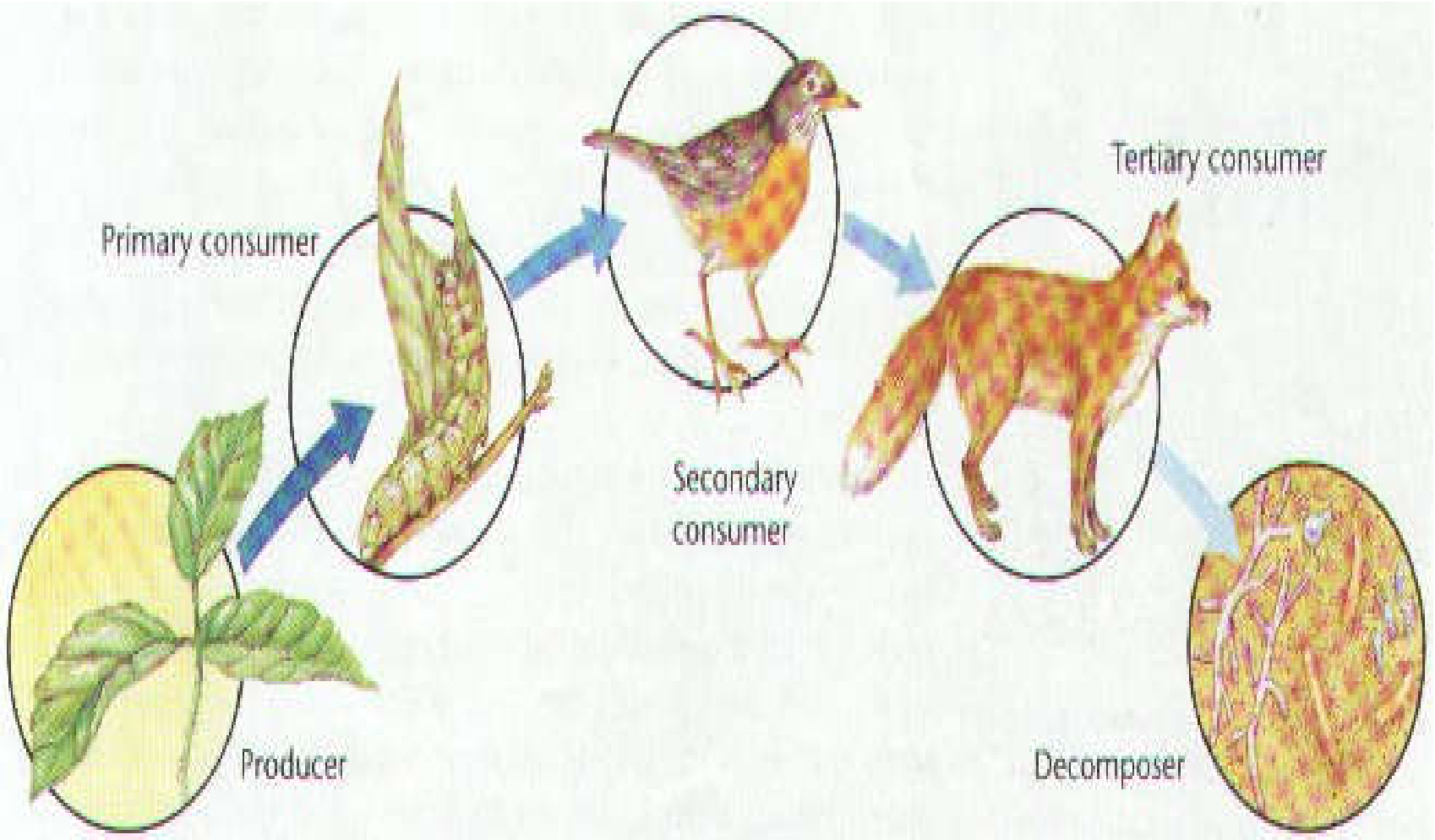
Fig.



Nitrogen cycle

- Life is based on energy. the Sun is the primary source of Energy on this planet. Plants and other producers turn light into chemical energy. The producers (trees, Plants) themselves and the consumers use this chemical energy to carry out processes of life.
- **A food chain** shows an energy relationship. A plant captures sunlight and uses it for photosynthesis. Photosynthesis is the process that is happened in plants and trees to make food themselves.

Example of a Food Chain

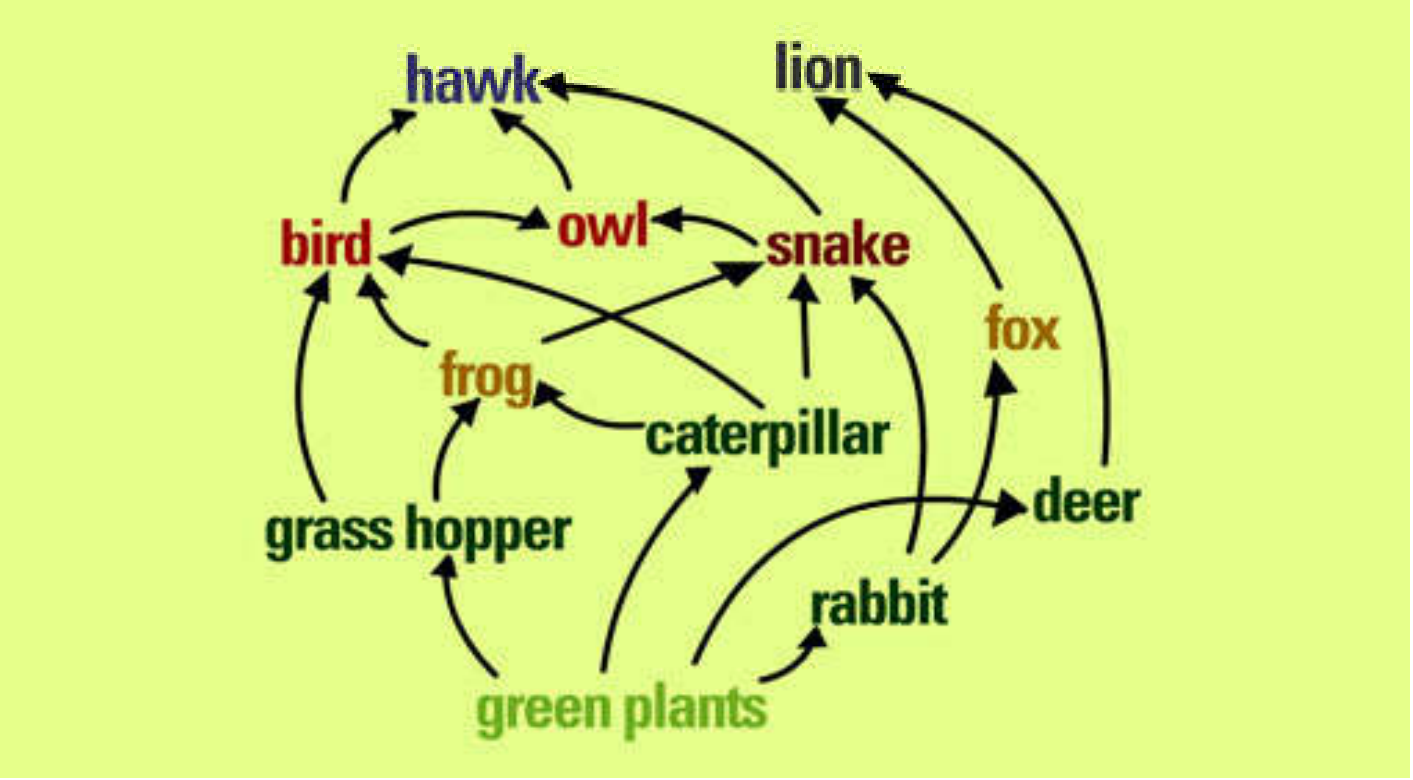


Food Web

A food web is a network of many food chains and is more complex.

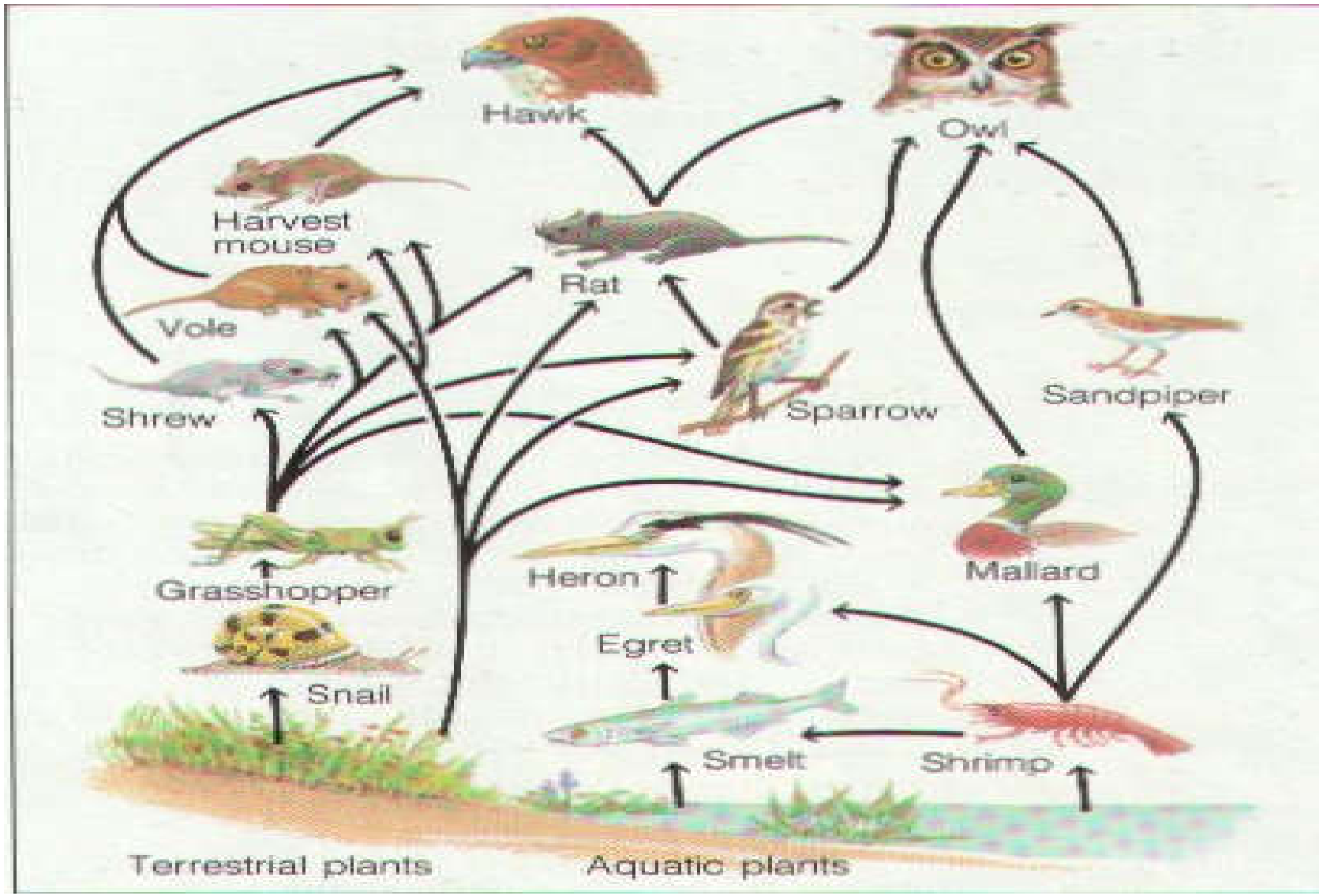
See the food web illustration below—you can pick out a basic food chain from the web:

Green plants → Grasshopper → Frog → Bird → Hawk

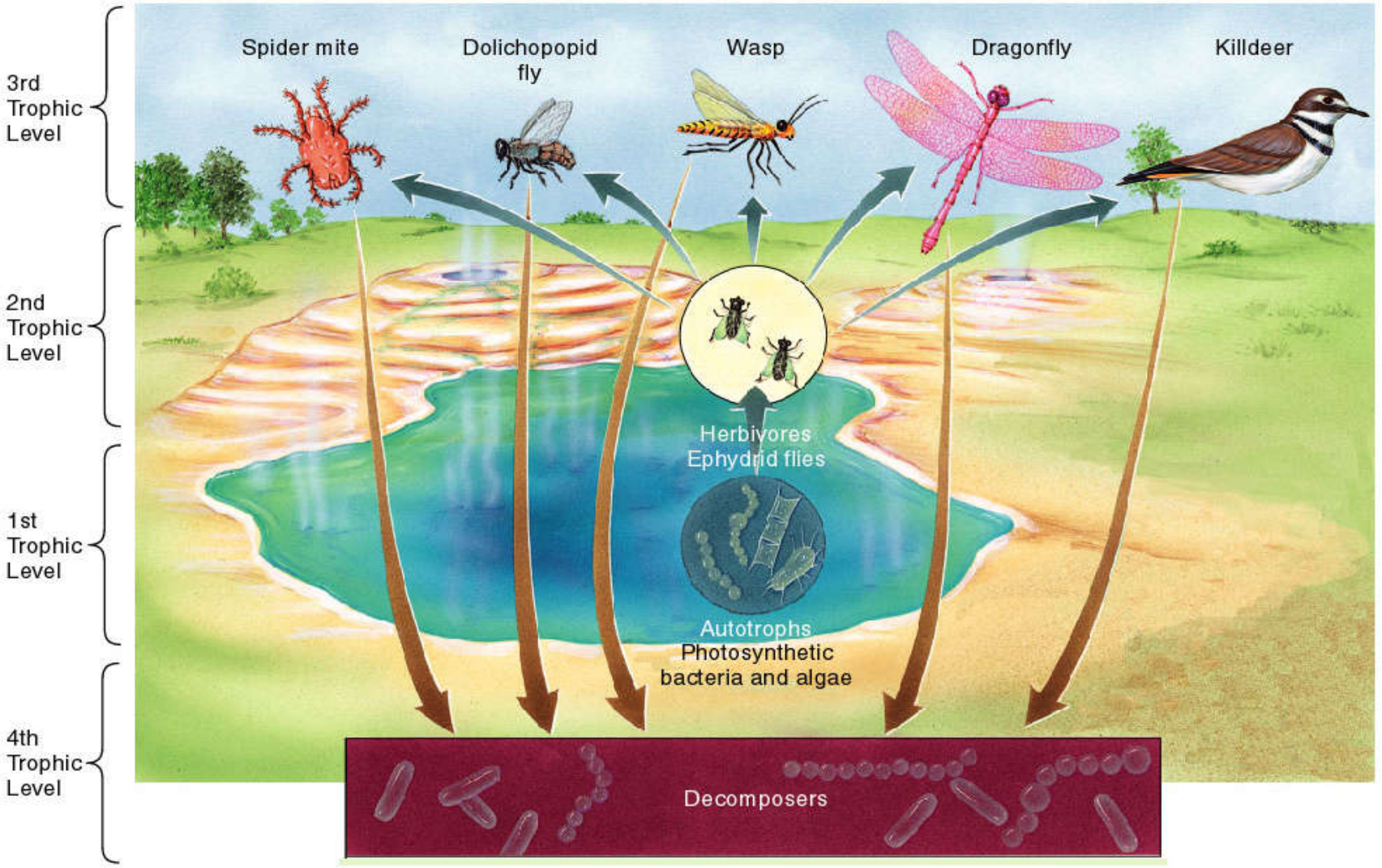


Food Webs

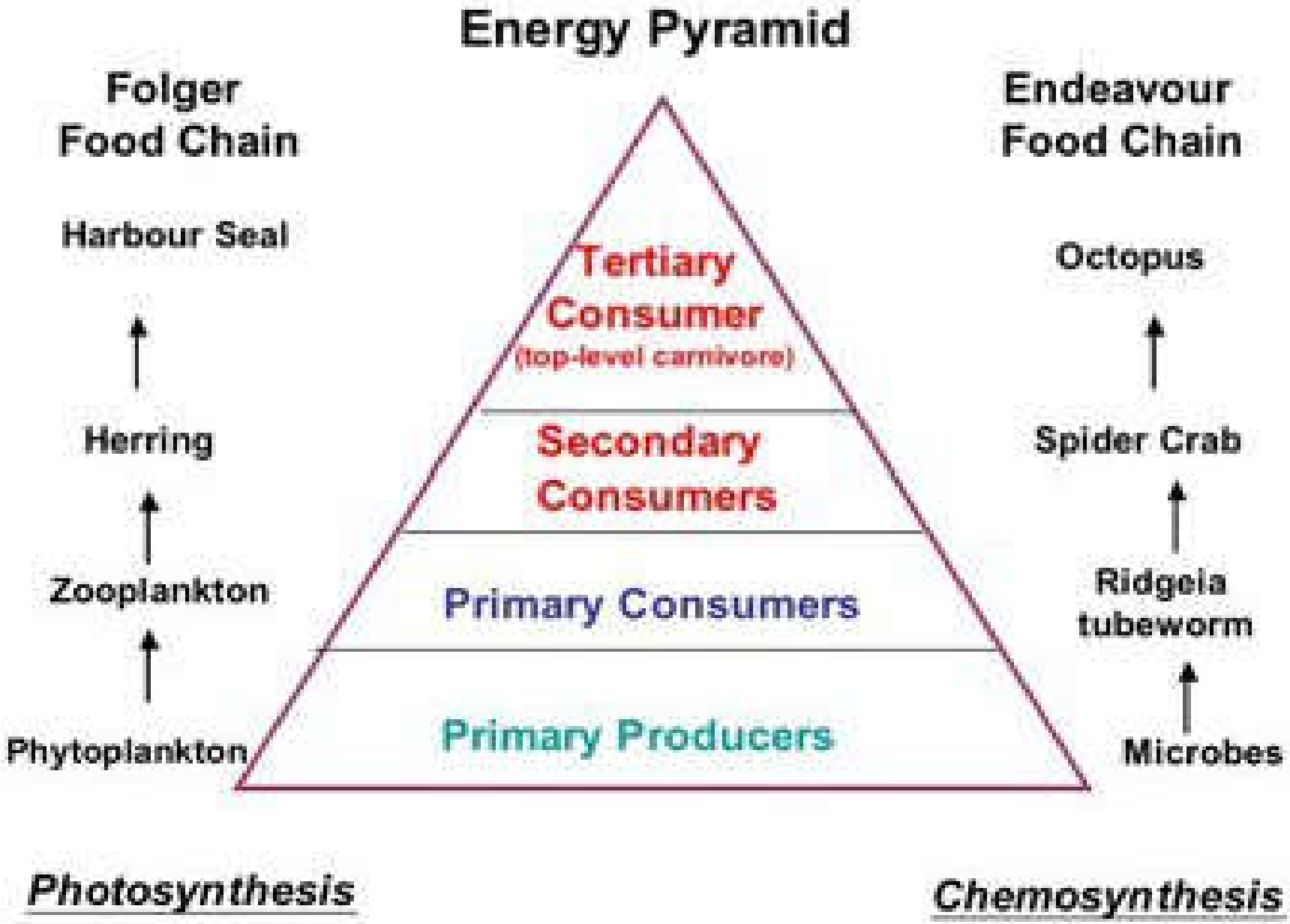
All the food chains in an area make up the **food web** of the area.



Food web of a hot spring



Energy Pyramid



Ecological Pyramids

- The ecological pyramids represent the trophic structure and also trophic function of the ecosystem. In many ecological pyramids, the producer form the base and the successive trophic levels make up the apex. The ecological pyramids may be of following three kinds.
- Pyramid of numbers
- Pyramid of Biomass
- Pyramid of Energy

Pyramid of Number:

- It depicts the number of individual organisms at different trophic levels of food chain. This pyramid was advanced by Charles Elton (1927), who pointed out the great difference in the number of the organisms involved in each step of the food chain. Successive links of trophic structure decrease rapidly in number until there are very few carnivores at the top.
- The pyramid of number ignores the biomass of organisms and it also does not indicate the energy transferred or the use of energy by the groups involved. The lake ecosystem provides a typical example for pyramid of number.

Pyramid of Biomass

- The biomass of the members of the food chain present at any one time forms the pyramid of the biomass. Pyramid of biomass indicates decrease of biomass in each tropical level from base to apex.
- For example, the total biomass of the producers ingested by herbivores is more than the total biomass of the herbivores in an ecosystem. Likewise, the total biomass of the primary carnivores (or secondary consumer) will be less than the herbivores and so on.

Pyramid of Energy:

- When production is considered in terms of energy, the pyramid indicates not only the amount of energy flow at each level, but more important, the actual role the various organisms play in the transfer of energy. An energy pyramid illustrates how much energy is needed as it flows upwards to support the next trophic level.
- The pyramid is constructed according to the rate at which food material(in the form of energy) passes through the food chain. Some organisms may have a small biomass, but the total energy they assimilate and pass on, may be considerably greater than that of organisms with a much larger biomass.

- Energy pyramids are always slopping because less energy is transferred from each level than was paid into it. In cases such as in open water communities the producers have less bulk than consumers but the energy they store and pass on must be greater than that of the next level.


ENERGY
TERTIARY CONSUMERS
(PREDITORS)
SECONDARY CONSUMERS
(PREDITORS)
PRIMARY CONSUMER
(HERBIVORES)
PRIMARY PRODUCERS
(PLANTS)
NUMBERS
EAGLES
LIZARDS
GRASSHOPPERS
BIOMASS
TERTIARY CONSUMERS
SECONDARY CONSUMERS
PRIMARY CONSUMERS
PRIMARY PRODUCERS

Biodiversity

- The word “biodiversity” is a contracted form of the term ‘biological diversity’. The Convention on Biological Diversity defines biodiversity as:

"the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems."

- Thus, biodiversity includes genetic variation within species, the variety of species in an area, and the variety of habitat types within a landscape. Biological diversity is of fundamental importance to the functioning of all natural and human-engineered ecosystems, and by extension to the ecosystem services that nature provides free of charge to human society. Living organisms play central roles in the cycles of major elements (carbon, nitrogen, and so on) and water in the environment, and diversity specifically is important in that these cycles require numerous interacting species.

- **The following are different types of biodiversity**

1. **Genetic diversity**: variety in the genetic makeup among individuals within a species
2. **Species diversity**: variety among the species or distinct types of living organisms found in different habitats of the planet
3. **Ecosystem or ecological diversity**: variety of forests, deserts, grasslands, streams, lakes, oceans, coral reefs, wetlands and other biological communities
4. **Functional diversity**: biological and chemical processes of functions such as energy flow and matter cycling needed for the survival of species and biological communities

- **Species Diversity**

  Every ecosystem contains a unique collection of species, all interacting with each other. Some ecosystems may have many more species than another. In some ecosystems, one species has grown so large that it dominates the natural community. When comparing the biodiversity of ecosystems, an ecosystem that has a large number of species, but no species greatly outnumbering the rest, would be considered to have the most species diversity. A large number of species can help an ecosystem recover from ecological threats, even if some species go extinct.

- **Genetic Diversity**

  Genetic diversity describes how closely related the members of one species are in a given ecosystem. In simple terms, if all members have many similar genes, the species has low genetic diversity. Because of their small populations, endangered species may have low genetic diversity due to inbreeding. This can pose a threat to a population if it leads to inheritance of undesirable traits or makes the species more susceptible to disease. Having high genetic diversity helps species adapt to changing environments.

- **Ecosystem Diversity**

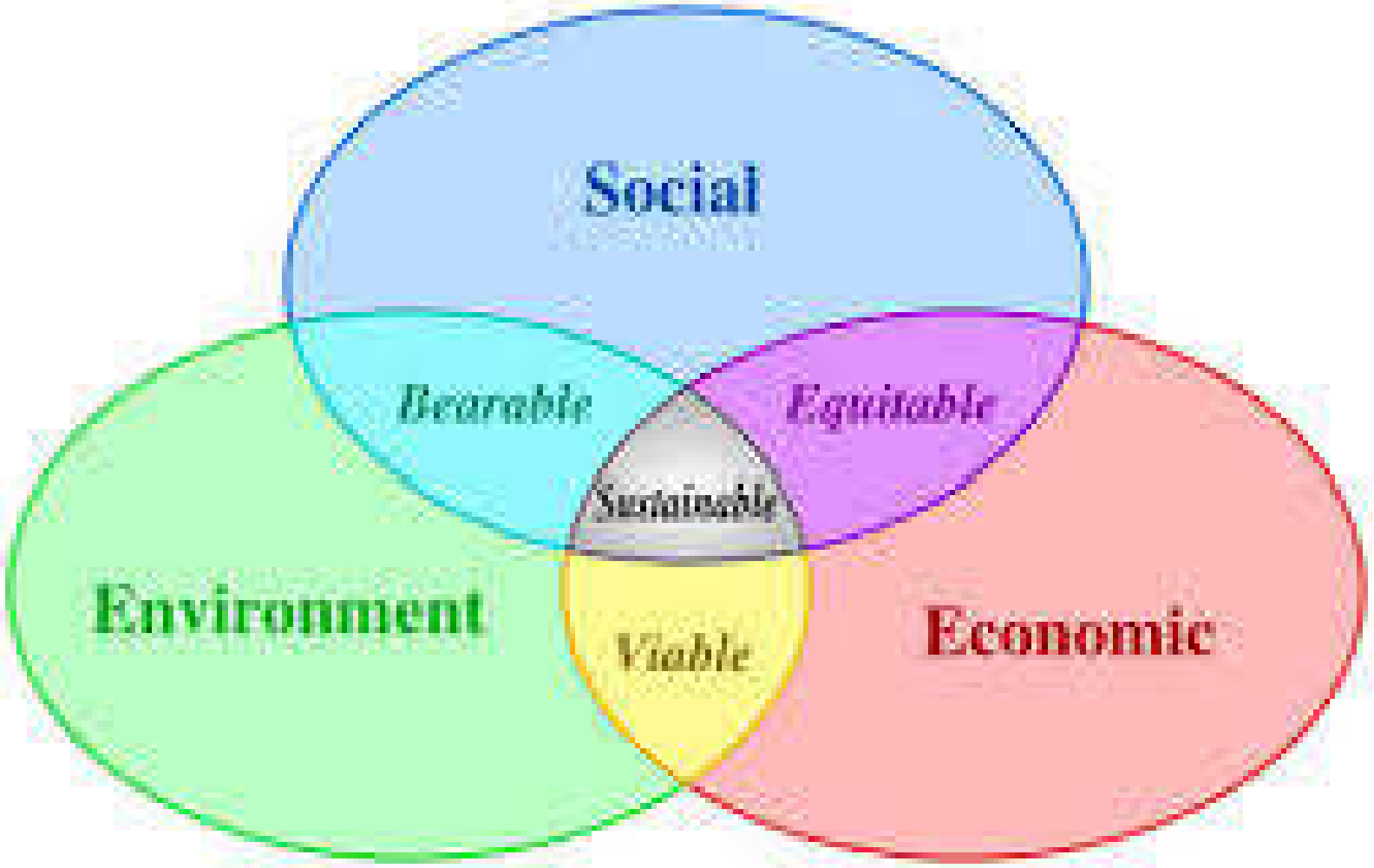
  A region may have several ecosystems, or it may have one. Wide expanses of oceans or deserts would be examples of regions with low ecological diversity. A mountain area that has lakes, forests and grasslands would have higher biodiversity, in this sense. A region with several ecosystems may be able to provide more resources to help native species survive, especially when one ecosystem is threatened by drought or disease.

- **Functional Diversity**

  The way species behave, obtain food and use the natural resources of an ecosystem is known as functional diversity. In general a species-rich ecosystem is presumed to have high functional diversity, because there are many species with many different behaviors. Understanding an ecosystem's functional diversity can be useful to ecologists trying to conserve or restore damaged it, because knowing the behaviors and roles of species can point to gaps in a food cycle or ecological niches that are lacking species.

Sustainable Ecosystem

- A sustainable ecosystem is a system that survives, functions, and is renewed over time; a system in which people can continue to live and flourish for many generations
- In ecology, **sustainability** refers to how biological systems remain diverse and productive. Long-lived and healthy wetlands and forests are examples of sustainable biological systems. In more general terms, sustainability is the endurance of systems and processes. The organizing principle for sustainability is sustainable development, which includes the four interconnected domains: ecology, economics, politics and culture.


Social
Bearable
Equitable
Sustainable
Environment
Viable
Economic

- Healthy ecosystems and environments are necessary to the survival of humans and other organisms. Ways of reducing negative human impact are environmentally-friendly chemical engineering, environmental resources management and environmental protection. Information is gained from green chemistry, earth science, environmental science and conservation biology. Ecological economics studies the fields of academic research that aim to address human economies and natural ecosystems.

- Moving towards sustainability is also a social challenge that entails international and national law, urban planning and transport, local and individual lifestyles and ethical consumerism. Ways of living more sustainably can take many forms from reorganising living conditions (e.g., ecovillages, eco- municipalities and sustainable cities), reappraising economic sectors (permaculture, green building, sustainable agriculture), or work practices using science to develop new technologies (green technologies, renewable energy and sustainable fission and fusion power), to adjustments in individual lifestyles that conserve natural resources.

Chapter-2

Current issues in environment pollution

- Global warming
- Greenhouse effect
- Acid rain
- Recycling of materials
- Maintenance of groundwater

What is Global Warming

Global Warming is the increase of Earth's average surface temperature due to effect of greenhouse gases, such as carbon dioxide emissions from burning fossil fuels or from deforestation

How we know we're causing global warming

Shrinking upper atmosphere

Less heat escaping to space

Cooling upper atmosphere

Rising tropopause

Winter warming faster than summer

More fossil fuel carbon in the air

Less oxygen in the air

Nights warming faster than days

More heat returning to Earth

Pattern of ocean warming

More fossil fuel carbon in trees

More fossil fuel carbon in coral

More fossil fuel carbon in ocean

Effects of global warming

- Sea level rise.
- Effects on weather.
- Effects on human health.
- Ocean temperature rise.
- Effect on wild life.
- Agriculture.

How to Stop global warming

- **Reduce, Reuse, Recycle**
- **Use Less Heat and Air Conditioning**
- **Use Less Hot Water**
- **Cover your pots while cooking**
- **Reuse your shopping bag**
- **Use the "Off" Switch**
- **Plant a tree**

What is greenhouse

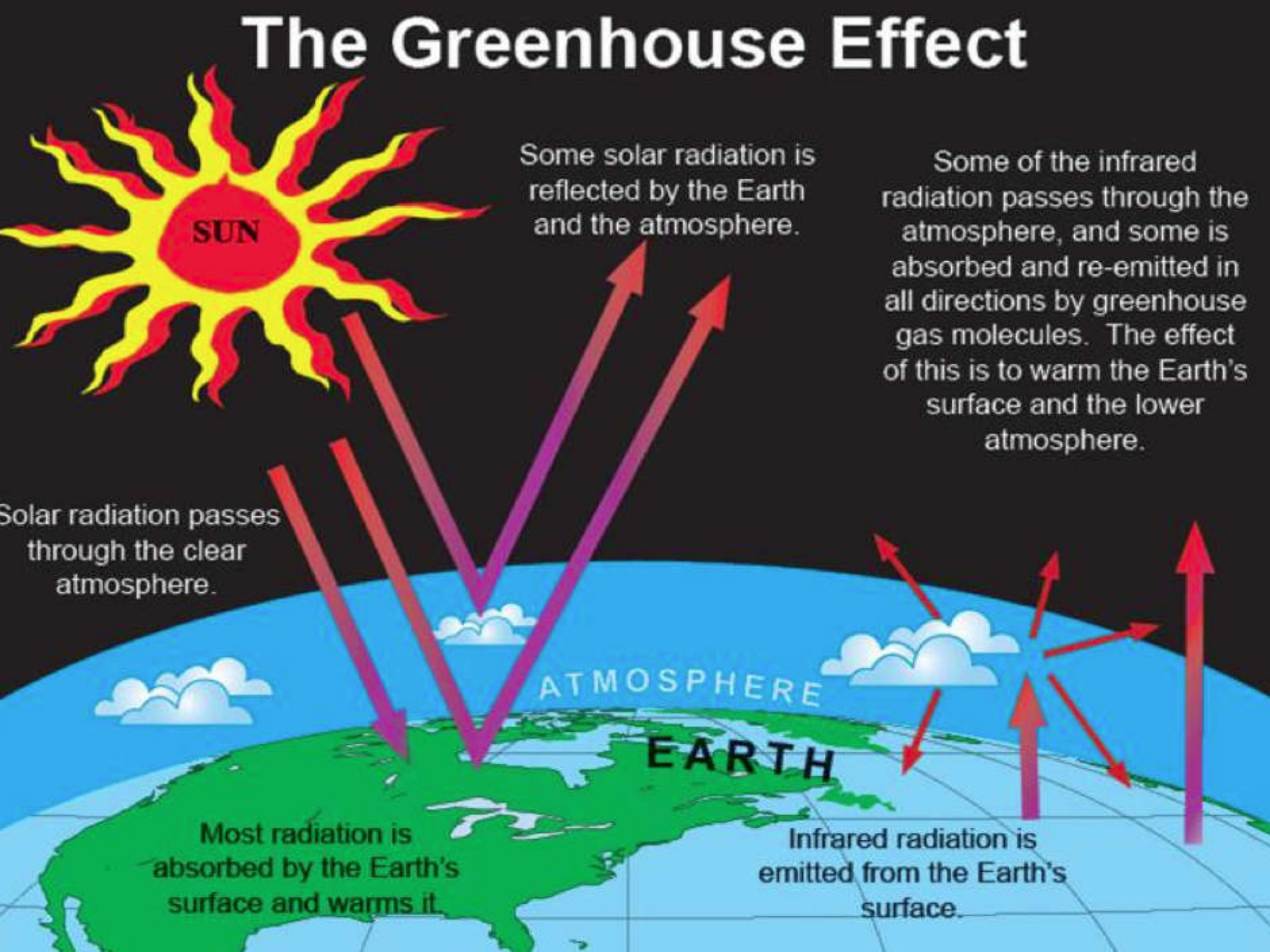
It is a glass house which is used for growing delicate plants especially during winter. It has higher temperature inside than outside. In a greenhouse, the glass panel allows the light in, but dose not allow heat to escape.

Thus the greenhouse warms up, very much like inside a car that has been parked in the sun for a few hours.

What is Greenhouse effect

The greenhouse effect is a naturally occurring phenomenon that is responsible for heating of Earth's surface and atmosphere.

The Greenhouse Effect



How to reduce greenhouse effect

- **Reduce, Reuse, Recycle**
- **Use Less Heat and Air Conditioning**
- **Use Less Hot Water**
- **Cover your pots while cooking**
- **Reuse your shopping bag**
- **Use the "Off" Switch**
- **Plant a tree**

Recycling of material

Recycling is processing of used material(waste) into new, useful products. This is done to reduce the use of raw materials that would have been used. Recycling also uses less energy and is great way of controlling air, water and land pollution.

Waste items that are usually recycled includes

- Paper waste: Paper waste items include books, newspapers, magazine, cardboard boxes and envelopes.
- Plastic waste: item include plastic bags, water bottles, rubber bags and plastic wrappers.
- Glass waste: All glass products like broken bottle, beer, and wine bottle can be recycled.
- Aluminium waste: Cans from soda drink, tomato, fruit cans and all other cans can be recycled.

Importance and Benefit

- Recycling helps protect environment.
- Recycling conserves natural resources.
- Recycling saves energy.

What is acid rain?

rainfall made so acidic by atmospheric pollution that it causes environmental harm, chiefly to forests and lakes. The main cause is the industrial burning of coal and other fossil fuels, the waste gases from which contain sulphur and nitrogen oxides which combine with atmospheric water to form acids.

Two type of acid rain

Wet acid rain:

These compounds when fall in the form of rain, fog, snow, they are in wet form.

Dry acid rain:

Acid forming gases like oxides of sulphur and nitrogen get deposited on the surface of buildings, vegetation, soil and other materials.

Ill effects of acid rain

- On building and monuments.
- On water bodies and aquatic life.
- On vegetation.
- On human health.

Control of acid rain

- Power plants should be reduced by using various pollution control methods.
- Liming of lakes and soils should be done to balance the acidic pH so that adverse effects of acid rain can be minimized.
- A coating of protective layer of inert polymer should be provided on the inside of pipes used for supply of drinking water.

Rainwater harvesting

In urban areas, the construction of house, footpaths and roads has left little exposed earth water to soak in. In parts of the rural area of India, floodwater quickly flows to the rivers, which then dry up soon after the rains stop. If this water can be held back, it can seep into the ground and recharge the groundwater supply.

Rainwater Collection in Asbestos Roofs

Why Rain water be harvested

- To conserve & augment the storage of ground water
- To reduce water table depletion
- To improve the quality of ground water
- To arrest sea water intrusion in coastal areas
- To avoid flood & water stagnation in urban areas
- It is the activity of direct collection of rain water
- Rain water can be stored for direct use or can be recharged into the ground water aquifer

Benefit of rainwater harvesting

- Increase water availability
- Is environment friendly
- Improve the quality of ground water

Reasons of Shortage of Water

- Population increase
- Industrialization
- Urbanization
    - (a) Increase in per capita utilization
    - (b) Less peculation area
- Decrease in surface area of Lakes, talab, tanks etc.

What is the solution ?

- Rain water is the ultimate source of fresh water
- Potential of rain to meet water demand is tremendous
- Rain water harvesting helps to overcome water scarcity
- To conserve ground water the aquifers must be recharged with rain water
- Rain water harvesting is the ultimate answer

Deforestation

With the world growing at a pace hard to match, the increasing need for space is turning out to be an area of concern. With desperate need for land for agricultural, industrial and most importantly urban needs to contain cities and their growing population, a direct action that we have come to recognize as “Deforestation” occurs.
Deforestation in simple term means the felling and clearing of forest cover or tree plantations in order to accommodate agricultural, industrial or urban use. It involves permanent end of forest cover to make that land available for residential, commercial or industrial purpose.

- Over the last century the forest cover around the globe has been greatly compromised, leaving the green cover down to an all time low of about 30 per cent. According to the United Nations Food and Agriculture Organization (FAO), an estimated 18 million acres (7.3 million hectares) of forest are lost each year.
- Deforestation can also be seen as removal of forests leading to several imbalances ecologically and environmentally. What makes deforestation alarming is the immediate and long term effects it is bound to inflict if continued at the current pace. Some predictions state that the rain forests of the world will be destroyed completely if deforestation continues at its current pace.

Deforestation or clearance occurs due to several reasons, to get an overview we could include the need of money, both in terms of profitability as well as providing for one's family in most scenarios, along with lack of or no forest laws, need for land space for housing etc among a long list of other uses. Mainly blamed on agricultural or pastoral use, farmers fell trees for increasing space for cultivation and/or as fodder land for grazing and surviving live stock. The whole concept of 'slash and burn' agriculture, is used to indicate this same process where farmers employ the above chain of actions for their purposes

Causes of Deforestation

1. **Agricultural activities:** As earlier mentioned in the overview, agricultural activities are one of the major factors affecting deforestation. Due to overgrowing demand for food products, huge amount of tress are fell down to grow crops and for cattle gazing.
2. **Logging:** Apart from this, wood based industries like paper, match-sticks, furniture etc also need a substantial amount of wood supply. Wood is used as fuel both directly and indirectly, therefore trees are chopped for supplies. Firewood and charcoal are examples of wood being used as fuel. Some of these industries thrive on illegal wood cutting and felling of trees.

3. **Urbanization:** Further on order to gain access to these forests, the construction of roads are undertaken; here again trees are chopped to create roads. Overpopulation too directly affects forest covers, as with the expansion of cities more land is needed to establish housing and settlements. Therefore forest land is reclaimed.
4. **Desertification of land:** Some of the other factors that lead to deforestation are also part natural and part anthropogenic like Desertification of land. It occurs due to land abuse making it unfit for growth of trees. Many industries in petrochemicals release their waste into rivers which results in soil erosion and make it unfit to grow plants and trees.

5. **Mining:** Oil and coal mining require considerable amount of forest land. Apart from this, roads and highways have to be built to make way for trucks and other equipment. The waste that comes out from mining pollutes the environment and effects the nearby species.
6. **Fires:** Another example would be forest blazes; Hundreds of trees are lost each year due to forest fires in various portions of the world. This happens due to extreme warm summers and milder winters. Fires, whether causes by man or nature results in huge loss of forest cover.

Effects of Deforestation

1. **Climate Imbalance**: Deforestation also affects the climate in more than one ways. Trees release water vapour in the air, which is compromised on with the lack of trees. Trees also provide the required shade that keeps the soil moist. This leads to the imbalance in the atmospheric temperature further making conditions for the ecology difficult. Flora and fauna across the world are accustomed to their habitat. This haphazard clearance of forests have forced several of these animals to shift from their native environment. Due to this several species are finding it difficult to survive or adapt to new habitats.

2. **Increase in Global Warming:** Trees play a major role in controlling global warming. The trees utilize the green house gases, restoring the balance in the atmosphere. With constant deforestation the ratio of green house gases in the atmosphere has increased, adding to our global warming woes.
3. **Soil Erosion:** Also due to the shade of trees the soil remains moist. With the clearance of tree cover, the soil is directly exposed to the sun, making it dry.

4. **Floods:** When it rains, trees absorb and store large amount of water with the help of their roots. When they are cut down, the flow of water is disrupted and leads to floods in some areas and droughts in other.

5. **Wildlife extinction**: Due to massive felling down of trees, various species of animals are lost. They lose their habitat and forced to move to new location. Some of them are even pushed to extinction. Our world has lost so many species of plants and animals in last couple of decades.

Control measures to Deforestation

1. The best solution to deforestation is to **curb the felling of trees**, **by employing a series of rules and laws to govern it**. Deforestation in the current scenario may have reduced however it would be too early to assume. The money-churner that forest resources can be, is tempting enough for deforestation to continue.
2. **Clear cutting of forests must be banned**. This will curb total depletion of the forest cover. It is a practical solution and is very feasible.

3. Land skinned of its tree cover for urban settlements should be urged to plant trees in the vicinity and replace the cut trees. Also the cutting must be replaced by planting young trees to replace the older ones that were cut. Trees are being planted under several initiatives every year, but they still don't match the numbers of the ones we've already lost.

Pollution

Undesirable Change in the Physical, Chemical or Biological Quality of Air, Water and Land.

It harmfully affects Human Life, Life desirable species, Industrial Processes and Cultural assests or damage the raw materials sources.

Source of Pollution

(1) Natural sources	(2) man Made sources
(a) Valcanic eruption	(a) Industries gases and waste
(b) Dust stroms	(b) Burning of fossils fuels.
(c) Forest fires	(c) Solid waste
(d) Bacteria, cysts etc.	(d) Agricultural waste
(e)	(e)Rapid Urbanization and Industrialization
(f)	(f) Automobiles
(g)	(g) Population growth.

Pollutants- Substances present in environment affect the growth rate of species adversely by damaging the growth rate of species, human health, comfort.

For example smoke, sewage, radioactive substance etc.

Classification of Pollutants

3 Types

(1) Depending upon existance in Nature

(i)-**Quantitative Pollutants**- these substance normally occur in environment bu if concenteration increased than it is pollutants e.g carbon

(ii)-**Qualitative pollutants**-substances which do not normally occur in environment added by man e.g insecticides.

(2)Depending upon the form in which they remain after Released

(i)-Primary Pollutants-these released from the source remain as such e.g smoke,ash,dust etc

(ii)-selondary pollutants- Primary Pollutants interact with some other Present e.g nitrogen dioxide, sulphurtrioxide etc.

(3)From Ecosystem Point of view

(i)Bio-degradable-these can be decouiposed by naturally means e.g domestic waste

(ii)Non Biodegradable-these Pollutants do not decpupose e.g DDT,Meaccury salts.

Air Pollutions

Adelition of foreign Particles, dust, gases, smoke etc in air, which adverse effect on human beings, plant, animals etc.

Cause/sources of air Pollution

(i)fixed combustion soures-Burning of fossil fuels in industries, house, thermal plant, brick kilns and Burning of coal etc.

(ii)Mobile Conbustion sources-Automobile, aircrafts etc. these release carbon monoxide, Nitrogen oxides etc. petrol contain lead which affect haemoglobin formation. Aerosols e.g CFC chlorofluoro carbons deplete ozone layer.

(iii)Industrial Process-Metallurgical process, welding, grinding etc. release gaseous Pollutants in air.

(iv)Secondary Air Pollutants- Smog and acid rain etc.

Effects of Air Pollution

(2)Effect on Human Health

(a)Dust smog cause asthma, lung cancer etc.
(b)Lead componds decrease the formation of red blood cells.
(c)High Concenteration of NO_2 cause, internal bleeding, cancer.
(d)High Level SO_2 cause , sneezing etc.
(e)Mercery cause kindly damage and mervous break down.

(2)Effect on Plants

(a)SO_2 cause loss of chlophyll
(b)NO_2 cause leaf fall,decreased growth of plants
(c)Ozone damage leaf
(d)Dust,smoke decrease pohotsynthesis

(3)Effects on Animales

(a)Intake of higher amonut of fluorive results abnormal growth of bones.
(b)Ozone cause irritation in dogs, cats etc.
(c)Acid rain affect aquatic life.
(d)UV rays cause cancer in wild life.

(4)Effects On Buildings

(a)Acid rain damage building materials.
(b)Metal undergo corrosion by acid.
(c)Paints get discoloured by SO_2,H_2S
(d)Cracking of rubber by ozone.

(5)Effect on Climate

(a) Due to deforestation and combustion of fuel cause flloding os coastal town affect the agricultural output.
(b)UV rays cause blindness,sunburn etc.

Control of Air Pollution

Preventtive Measures

(1)Selection of suitable fuels
(2)Setting of industries away from resident area
(3)Modification of equipments
(4)Planting More Trees
(5)Controlling Automobile Polution

Control measures

(i)Gravitational setting chamber- Remove particals exceeding 50 mm in size from polluted gas stream
(ii)Cyclone separator- it use celntrifugal force to separate the particles from gas polluted air receives rotating motion due to centrifugal force particales slide down the walls.
(iii)Fabric filters- stream of polluted gas is made to pass thought fabric which filter particles.
(iv)Wet collectors- It use water or any other liquid to remove particular matter by absorption/adsorption.

Control of Automobile Pollutants

(1)By use of afficient engine
(2)By use of catalfly convertors
(3)By use Of good Fuels
(4)BY using lead free petrol

Water Pollution

Presence of undesirable substance in water in such quantity so as to cause health hazard.

Sourse of Water Pollution

(1)**Community waste water**- Discharge from houses, commercial industries

connected to public sewage system. It is rich in organic matter which multiple bacteria which use oxygen. Lake of oxygen kills fishes other aquatic life.

BOD – Water pollution by organic wastes in measured in terms in bio chemicals oxygen demand. It is amount of dissolved oxygen needed bacteria in decomposing the oxygen waste present in water. It is expressed in miligrams of O_2/it of water.

(2) Industrial waste- Metallargical industry, food plants, textile mills, paper, sugar mills etc. discharge several inorganic organic pollutants.

(3) Agricultural waste- artificial fertilizers, pesticides contains chlorinates, metallic, salts, carbonate etc. cause water pollution.

(4) Animal excreta – Durg, waste from poultry, piyyeries are discharge into water.

(5) Thermal Pollution- it cause rise in temperature of water sudden rise in temperature kills fishes.

Effects of water Pollutions

(1)Acid, alkalies cause corrosion in water

(2)Rise in Temp. of water kill the aqatic life

(3)Lead poisioning cause mental disability and anemia.

(4)Free chlorine cause heavy fish mortality.

(5)Most of water born disease such as typhoid ,cholera polio etc. caused by consuming contaminated water

Control of water Pollution

(1)Sewage should be suitable treated before releasing in into water

(a)Primary treatment invoice physical method such as sedlimentation and filteration .

(b)Secondary treatment invoice biological oxidation of organic matter

(c)Thirt treatment is physiochemical process to remove turbidity of water

(2)Industrial Waste can be coagulated or precipitated.

(3)Hot water should be cooler before released from power plants.

(4)Washing clothes and taking bath should be prohibited directly in tanks, rivers etc.

(5)Execesive use of fertilizers, pesticides should be avoided.

(6)Ponds, lacks should be cleaned properly
(7)Public awareness should be created.

Noise Pollution

A Loud unueanted sound which cause discomfort is called noise pollution
Unit of sound level is decibel (dB)
Intensity of normal conversation sound ranges between 35 db to 60 db cause hearing problems

Source of Noise Pollution

Various Industries such as textile mills, printing presses vehicles, domestic gadgets, television public address system etc. The opretion such as blasting stone crushing, cinstruction cook and use of crackers cause noise pollution.

Effects of Noise Pollution

(1)Noise cause hearing problems .
(2)It affects sleep and coop efficiency.
(3)Noise cause headache , It effect nervous system.
(4)Noise Pollution cause depression and fatigue.

Control of Noise Pollution

(1)Industries, railway station etc. should be located away.
(2) Proper lubrication and maintenance of machine.
(3) Use of sound proof chamber.
(4) Planting several rows of trees.
(5)Use of loud speakers and amplifiers should be restricted.
(6)Ear plugs should be used.
(7)People must be aware of health hazards though newspaper, articles, television etc.

Soil Pollution

Contamination of soil by chemicals or other substances resulting in the reduction

of its fertility of soil is called soil Pollution.
They enter into food chain cause lot of hazard.

Source of Soil Pollution

(1)Industrial Waste-Disposal of industrial waste from chemical industry, sugar factory, textile, steel, paper industry etc.

(2)Agricultural Waste- Fertilizers, pesticides, insecticides etc. cause soil pollution

(3)Urban Waste-Plastic , glass, fibers , paper etc.

(4)Redivactive waste- they peneterate into soil enter into food chain cause adverse effects on body.

(5)Biological Agents-Human and animals excreta etc.

Effects of Soil Pollution

(1)Effects of Industrial Pollutants- Chemical enter food chain mercury, caduium etc. Destroy beneficial micro-organition in soil

(2)Effects of agricultural Poluutants

(i) Nitrogeneous fertilizers cause diarrhea and cyanosis in children.

(ii) Pesticides like DDT contaminate drinking water supply.

(iii) Long lasting effects of pesticide Interfere Metabolic activities.

(3)Effects of urban wates

(i) Urban wastes results several chronic disease.

(ii) Dead animals through into soil cause danger in human life.

(4)Effect of radioactive Pollutants

(i) It cause undesirable disease.

(ii) Radiation affect the soil fertility kill plant species.

Control of soil Pollution

(1)Soil waste water should be properly disposed off.

(2)Pesticides should be used in limited amount.

(3) biological Pesticides should be used.

(4)Soil Erosion should be prevented.

(5)Water logging should prevented.

Radioactive/Nuclear Pollution

Certain elements such as Radioactive, thorium, uranium etc. unit proton, electron, and gamma rays is released mainly from thermonuclear explosion. This properly is called Radioactive.

Sources of Radioactive Pollution

Natural sources

(i) Cosmic Rays

(ii) Radiation from uranium 235 uranium 238 radium 222etc.

Man made sources

(i) Testing of Nuclear Weapon atomic reactors etc.

(ii) X-ray therapy for cancer patient.

Effects of Radioactive Pollution

(1)Heat released by atomic fusion cause burn humans plants, animals etc.
(2)Radiation cause gene mutations.
(3) Birth of dead babies.
(4)Defects of new born babies.
(5)Reduced fertility
(6) cancer
(7)Mental, retardation, Anemia.

Control of Radioactive Pollution

(1)Nuclear reactor must be enclosed in broad concrete walls.
(2)Radioactive waste must be stored in underground tanks.
(3) workers must wear protective garments.
(4) workers must wear radiation indicators.
(5)Explosion of nuclear bombs must be stopped.

Cleaner Production

It in the continuous application of practices that reduce the creation of pollutants or wastes.

Cleaner Production Includes

(1) Conserving raw materials and chary.
(2) elimination toxic raw Materials.
(3) Reducing the toxicity of all emission.

Principles of Cleaner Production

(1)Input Substitution

(i)Use of less hazardous raw materials.
(ii)Use of raw materials with longer life lime.

(2)Good Housekeeping- e.g reduce losses due to leapage

(3)Internal Recycling- Proper use of water, material and energy etc.

(4)Technological optimization

(1)Use of new technology
(2)Redesign of process.

(5)Optimistion of Product

(1)Easy repair.
(2) Easy recycling.

Physical-Chemical-Biological Treatment Of Waste Pollutant

(1)Physical-Chemical-Treatment- Process designed to separate and concentrate various components of water stream without changing its chemical form. Filteration and sedimentation are too example for physical treatment.

(2) Chemical-Treatment- It include the chemical transformation of one or more components if waste stream
Following process are carried Out.
(1)Oxidation (2) Reduction (3) Neutralization (4)Sedimentation (5) Pressure filteration (6)Solidification

(3)<u>Biological Treatment-</u> In this method organic , material is used as a substrate for microbial growth resulting decomposition of organics. $H2_0$ and O_2 is essential for aerobic treatment decompose simple and complex organic compounds anaerobic process decompose simple organic such as carbohydrate, proteins ,acids etc.

Leveral Factors Affect The Level Of Treatment

(1)<u>Type of Organic contaminant</u> -Pesticides not decomposed by microbial action.
(2)<u>Concenteration of contaminant</u> -Adequate amount of continents support the microbial population of contaminant support the microbial population.
(3)<u>Presence of Inhibitors</u>-Some Inoganics may inhibits microbial action.
(4)<u>Suitable environment</u>-Suitable environment should be provide to the microbial population.
(5)<u>Reaction Time</u>-The Period of time waste is in contact with the microbial population determine the level of treatment.

Photo Catalysts Degradation Of Pollutants

<u>Photo Catalysts-</u>substance which is activated by absorbing photon, enhance the reaction without being consumed.
Mainly semiconductor such as TO2,Zn0,fez03,Cds,ZnS etc. as photo catalysts.
Tio2 is most commonly used due to its high reactivity reduced toxicity, chemical stability and lower cost.
UV/Tio2 a dsorp the photon with energy [<390mm]
Ti02+hv (<390mm) ->eCB + h+vB
h+vB oxidize organic compounds
e-cB is the Reducing agent
hvB+ react with organic compounds and react with H20 product (OH) hydroxy radical
Ti02 + hv(<390) ->ecB+
h^+vb + R -> Co2+H2o

$H_2O + h^+vB \rightarrow OH\ HT$

$OH + R \rightarrow Co_2 + H_2O$

Sunlight and artificial UV lamps are most commonly used source of ultraviolet radiation.

Waste Minimization- It is the process of reducing the amount of waste proced in society and elimination the generation of harmful waste.

Benefits Of waste Minimization

(1)It achieve more output of product.
(2)It reduce cost of purchasing new materials.
(3)Overall reputation enhanced.
(4)New technique reduce the waste generation.
(5)It helps to meet target of environmental regulation and policies.

Waste Minimization Technique

(1) Optimaion of resources should be done
(2) Reese of scrap metal in various industries
(3)Quality Control and process Monitoring -> By increasing the inspection points.
(4)Exchange of waste by different industries.
(5)Delivery at waste by different industries.
(6)Zero waste

Zero Discharge

(i)No discharge of polluting substance into environment
(ii)Recovery of reusable water.

Objective of Zero Discharge

(1)Recovered of Reusable water.
(2)Pollutant in Waste Water Transferred to solid phase.

(3)Sludge is stored in landfill
(4)Suitable process in reused
(5)The process do not generate any other pollutants.

4. Solid waste Management

Solid waste-It is the solid and semisolid waste arising from human and animals activities expert human excreta for e.g. (Waste from bathrooms kitchens etc.)

Classifucation of Solid waste

(1)Type of waste

(i)Biodegradable waste- The waste can be broken down into harmless substances by the action of microorganism is called biodegradable waste. Food waste,garden waste, farm waste.

(ii) Nonbiodegradable waste- the waste cannot be broken down by the action of microorganisms is called non biodegradable waste plastics, tires, Metal etc.

On The Basic of Source of waste/source if solid waste

(1)Municipals Solid waste-Household waste, waste from streets sanitation waste, construction waste etc. with increasing urbanization municipal solid waste increasing some household waste are harmful such as expired medicine bottle, shoe polish, batteries etc.

(2)Industrial Solid waste-Main sources are thermal power plant sugar industries, pulp and paper, fertilizer etc. release waste

(3)Biomedical Solid waste-waste realized by hospitals clinics, diagnostic centers etc. includes cotton syringes bandage, glass bottles, plastic are quite harmful.

Cause of Rapid Growth of Solid waste

(1)Over Population-Increase solid waste

(2)Urbanization-Increase solid waste
(3)Technology- Retunable glass are being used metal can, plastic cans etc.
(4)Affluence-Rich people discard the solid waste more.

Effects of solid waste

(1)Files breed on dump waste and contaminated water and fool. Cause disease like diarrhoea, dysentry etc.
(2)Rat may cause plague, trichinesis.
(3)Percolalation of decomposed waste leads to water and land.
(4) smoke due to burning of fuel pollute air
(5)Bad odor pollute air.
(6)Contaminated water supply may spread jaundice cholera etc.
(7)Solid waste choke drain result in water logging.

Control of Solid waste

Three Tasks

(1)Collection of Solid Water-Collecting the waste transporting it to centralized location then moving in to the site of disposal. Hazardous and non-hazardous separated.

(2)Disposal of Solid Waste-the main processing technique are land filling , incineration, manual separation etc.
It should be economic.
It should not create health hazard.
It should not result in unpleasant sight, order, noise

(3)Utilization of solid waste-The solid waste can be properly utilized to obtain benefits such as
(1)Conservation of nature sources
(2)Economic Development
(3)Employment opportunities.
(4)Control of air pollution.

Method of solid waste Disposal

1. Land filling-Garbage is basically spread out in thin layer, compressed and covered with soil or plastic form bottom of land fill also covered with plastic and sand layer.

Advantage

(1) It is simple economical.
(2)Separation of waste not required.
(3) Building can be made over land filling.
(4)Natural resources recycled.

Disadvantages

(1)It is simple economical.
(2)Separation of waste not required.
(3)Building can be made over land filling.
(4)Natural Resources recycled.

2.Incineration-solid waste burnt in a furnace incinerator Non combustible substances should be separated. The leftover ashes and clinker further disposed off by land filling

Advantage-

(1) Waste reduced to 20%-25%
(2)It Require little space.
(3)Cost of Transportation not high.
(4)It is Safe.

Disadvantage

(1)Its operating cost is high.
(2)It need skilled person.
(3)Formation of smoke, dust cause air pollution.

Composting-Biodegradable waste is allowed to decompose in specially designed chamber. Good quality manure formed.

Advantage-

(1)manure added to soil increases water retention
(2)Manure Can be sold Recycling can be done.

Disadvantage-

Non combustible material have to disposed off separately.

4.Pulverizazion- solid waste is pulverized in grinding machine to reduce its volume. It's become odorless and unattractive. The dispose off by land filling.

5.Pyrolysies-Chemical energy of done organic waste is recovered by destructive distillation. Solid waste is heated in pyrolysies reactor at 650 to 1000c

6.Disposal into sea-It is simple and cheap this method is not suitable during strong weather, solid waste may return to beaces.

E-waste-Discarded electronic products such as computer, television, stereos, cell phones etc are E-Waste. It not disposed off properly maycause soil and water pollution.

Effects of E-Waste on Human Health

Sources of E-Waste	Constitutes	Health effect
(1)Mother Board	Beryllium	Lung Cancer, Skin disease
(2)Computer Housing	PVC	Damage of immune system and hormonal

		system
(3)Relay Switches	Mercury	Brain, skin disorder
(4)Semiconductor Chip Resistor	Cadmium	Damage to kindly lever.
(5)Solder in PCBs	Lead	Damage to Blood system, Kidney

E-Waste Management

(1)Inventory Management- By Controlling the hazardous raw material and amount of excess raw material in stock Quality Of waste can be reduced. This can be done by two ways

(i)Material Purchase Review-all the ,materials be approved prior to purchase.
(ii)Inventory Tracking System-Only needed quantity of materials be ordered.

(2)Production Process Modification-BY Changing raw Materials or by efficient use materials, waste generation can be reduced.

(3)Volume Generation-The techniques used to reduce volume can be divided into two ways-

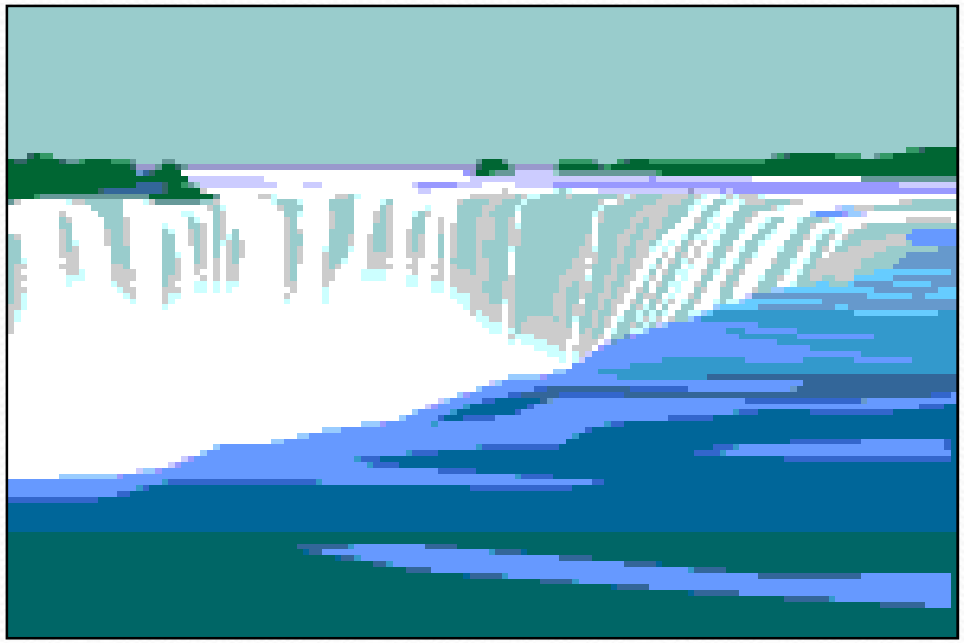
(i)Waste Segregation-Waste containin g different type of metals are treated separately so metal can be recovered.
(ii)Waste Concenteration- Material can be recycled and reused , method include gravity separation vaccum Filteration, reverse osmosies etc.
(iii)Recovery and Reuse-This technique eliminate waste disposed cost, reduce raw material cost and provide income from salable waste.
Vacuum filteration, reverse osmosis, condensation centrifugation etc. are the techanique to reclaim waste materials.

Chapter-6

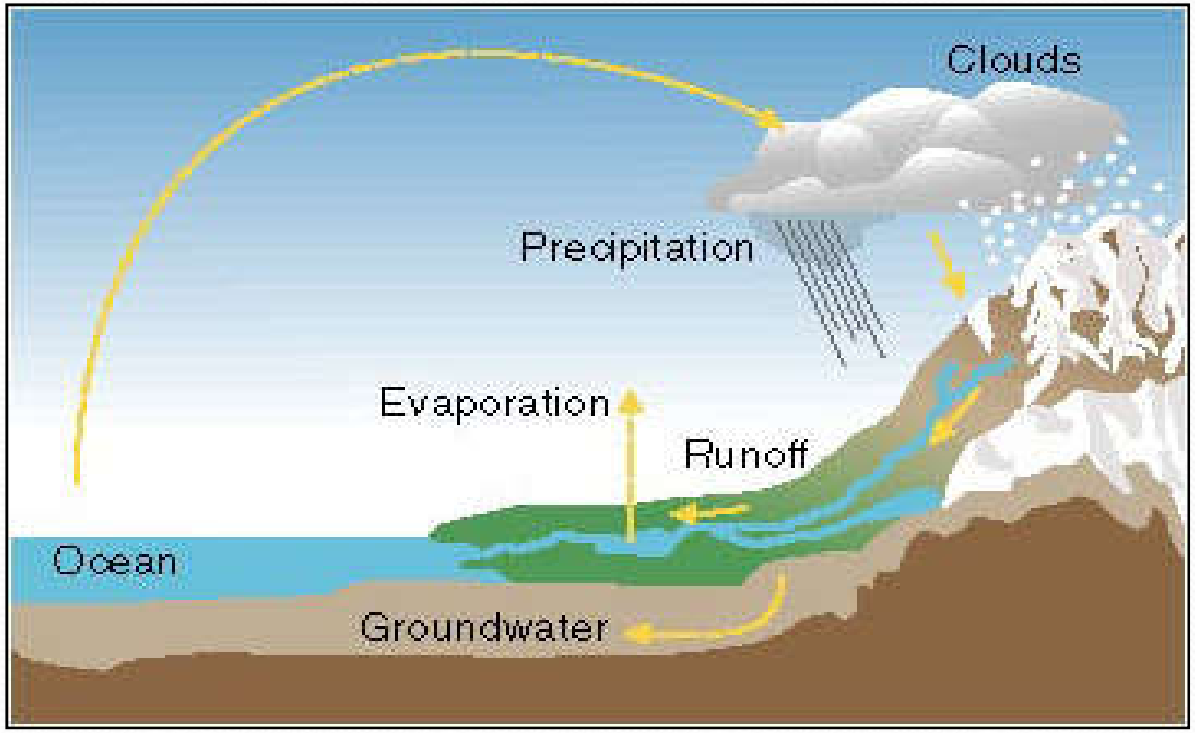
Non-conventional Energy Resoures

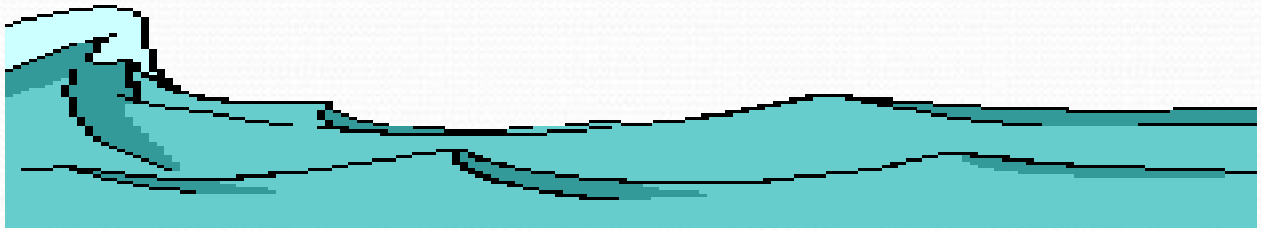
- Hydroelectric Power
- Solar Energy
- Wind Energy
- Biomass Energy

Hydroelectric power (often called hydropower) is considered a **renewable energy source.** A renewable energy source is one that is not depleted (used up) in the production of energy. Through hydropower, the energy in falling water is converted into electricity without "using up" the water.

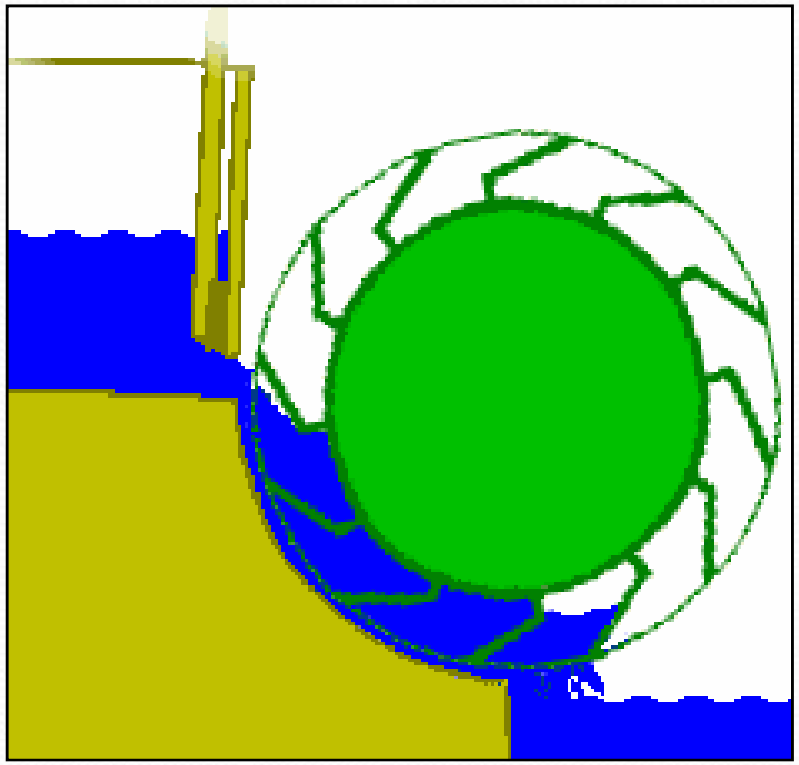


Hydropower energy is ultimately derived from the sun, which drives the **water cycle**. In the water cycle, rivers are recharged in a continuous cycle. Because of the force of gravity, water flows from high points to low points. There is **kinetic energy** embodied in the flow of water.





Kinetic energy is the energy of motion. Any moving object has kinetic energy.



Humans first learned to harness the kinetic energy in water by using **waterwheels**.

A waterwheel is a revolving wheel fitted with blades, buckets, or vanes.

Waterwheels convert the kinetic energy of flowing water to **mechanical energy**.

Mechanical energy is a form of kinetic energy, such as in a machine. Mechanical energy has the ability to do work. Any object that is able to do work has mechanical energy.

Hydropower is an important renewable energy source world wide...

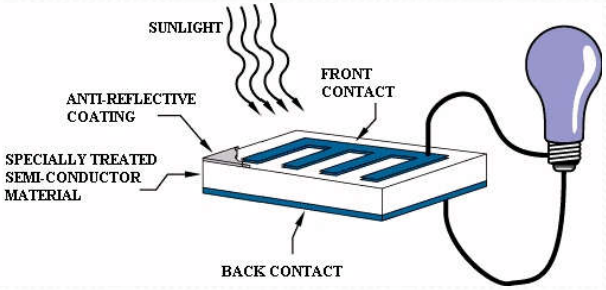

Solar Power

What is Solar Power?

- A renewable energy source
- The conversion of solar power from the sun into heat or electricity
- Uses solar panels
- There are three main methods of obtaining solar power
- Best suited for areas where there is low cloud cover that will block out the sunlight

Methods of Using Solar Energy

- **Photovoltaic cells**
  Consists of semi-conductors
  As light hits the surface, energy is produced
- **Solar Thermal Electricity**
  A mirror is used to reflect the sunlight to a central receiver
  A fluid is circulated that drives a generator
  The generator produces electricity
- **Solar Thermal Heater**
  Solar panels on roof absorbs sunlight
  Sunlight is converted into energy that heats the house



Two Main Categories:

Solar Thermal

Water heating and cooking

Solar Photovoltaic (PV)

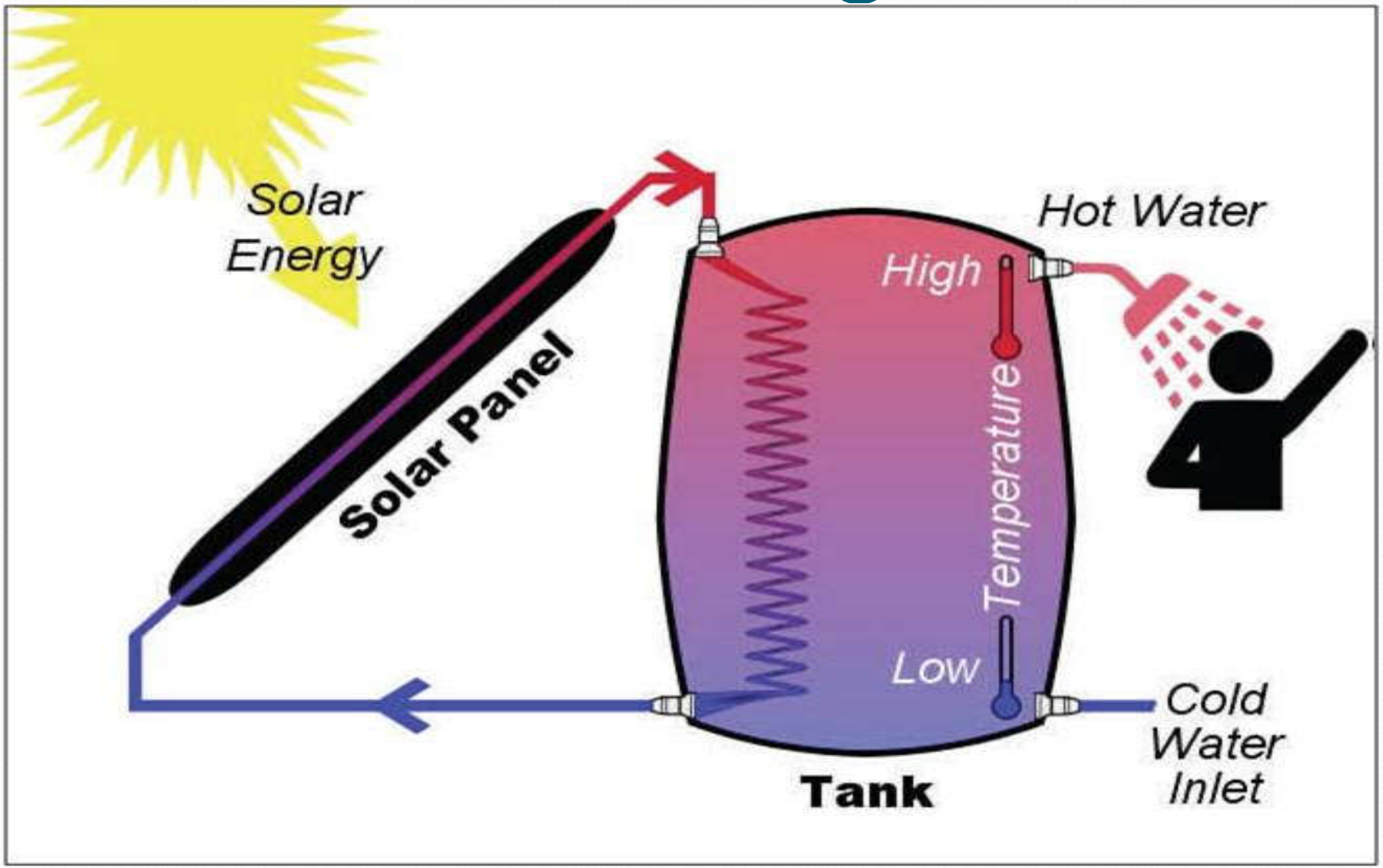
Electricity production

Solar Thermal Energy

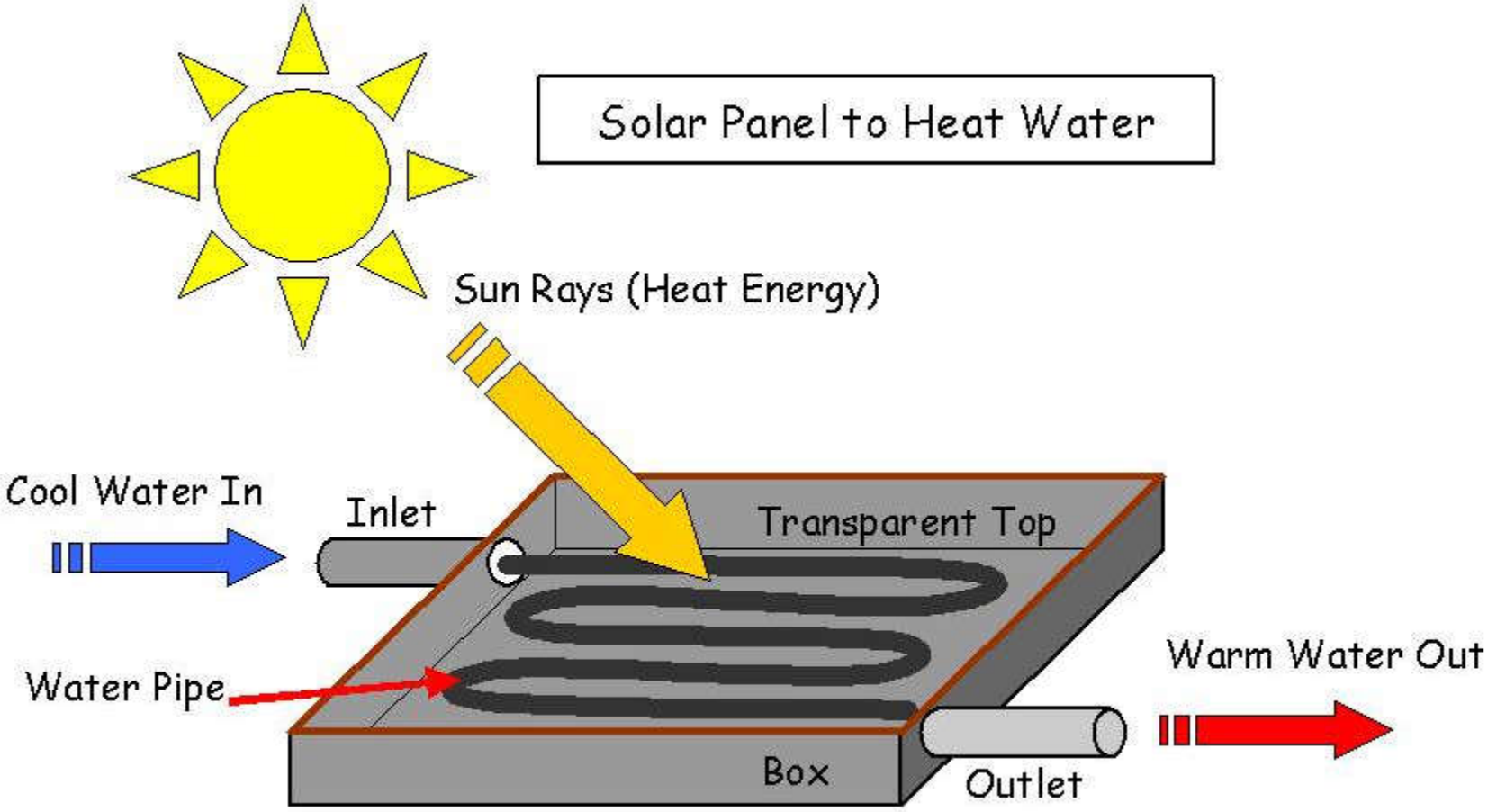
Cooking

Water Heating

Solar Water Heating



How Does it Work?



Advantages

- Renewable
- Produces no pollution or waste
- If the area is sunny, solar energy can be used in remote areas where no other energy source is available
- Require very little maintenance
- Although expensive in the beginning, you will save a lot money in the long-term

Disadvantages

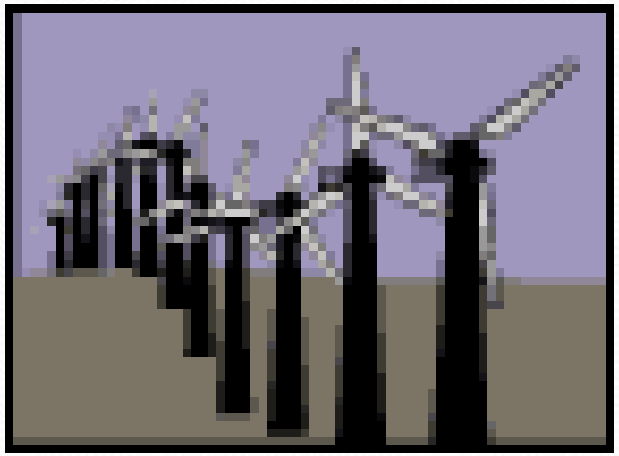
- Doesn't work at night
- Solar cells/panels can be very expensive
- Can be unreliable unless you're in a very sunny climate. For example, it wouldn't be very effective in the United Kingdom
- Solar power isn't much use for high-power applications. It may just be enough to heat your house. To obtain decent amounts of solar power, you need a large area of solar panels.

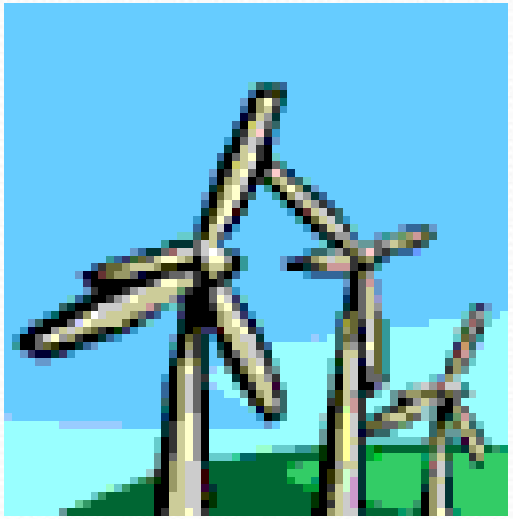
The Effects of Solar Power on the. . .

- **Atmosphere:** No release of pollutants
- **Lithosphere:** No effect because solar panels are usually just installed on pre-existing buildings
- **Hydrosphere:** No effect
- **Biosphere:** Light is reflected off the panels. This light can distract birds and even airplane pilots. This can be dangerous.


Wind Power
Aleksandar Rodic © 2007

What is Wind Power?





- It is a renewable energy source
- The use of the wind to produce electricity
- Wind energy is the fastest growing energy source on earth
- The rate at which technology is improving is making wind power more and more appealing
- Most effective in areas that receive a decent amount of wind

Advantages

- The wind is free
- Does not cause green house gases or other pollutants.
- Although wind turbines can be very tall, they only take up a small plot of land. Therefore, the land below can still be used (example: for agriculture)
- Wind farms are appealing to the landscape.
- Remote areas that have no other energy source available can use wind turbines to produce their own supply.

Disadvantages

- The amount of wind available always varies. There will be times when they produce no electricity at all.
- Wind turbines can be noisy. It can be equivalent to the noise of a car traveling at 70 mph.
- They do not produce enough electricity to power large amounts of homes.
- Birds and bats are threatened because they can get caught in the turbines.

The Effects of Wind Power on the. . .

- **Atmosphere:** No release of pollutants
- **Lithosphere:** The river on the ground may affect the soil structure
- **Hydrosphere:** No effect
- **Biosphere:** Birds/bats get caught in the wind turbines. This could threaten the population of the birds.


Biomass energy

What is the use of biomass energy?

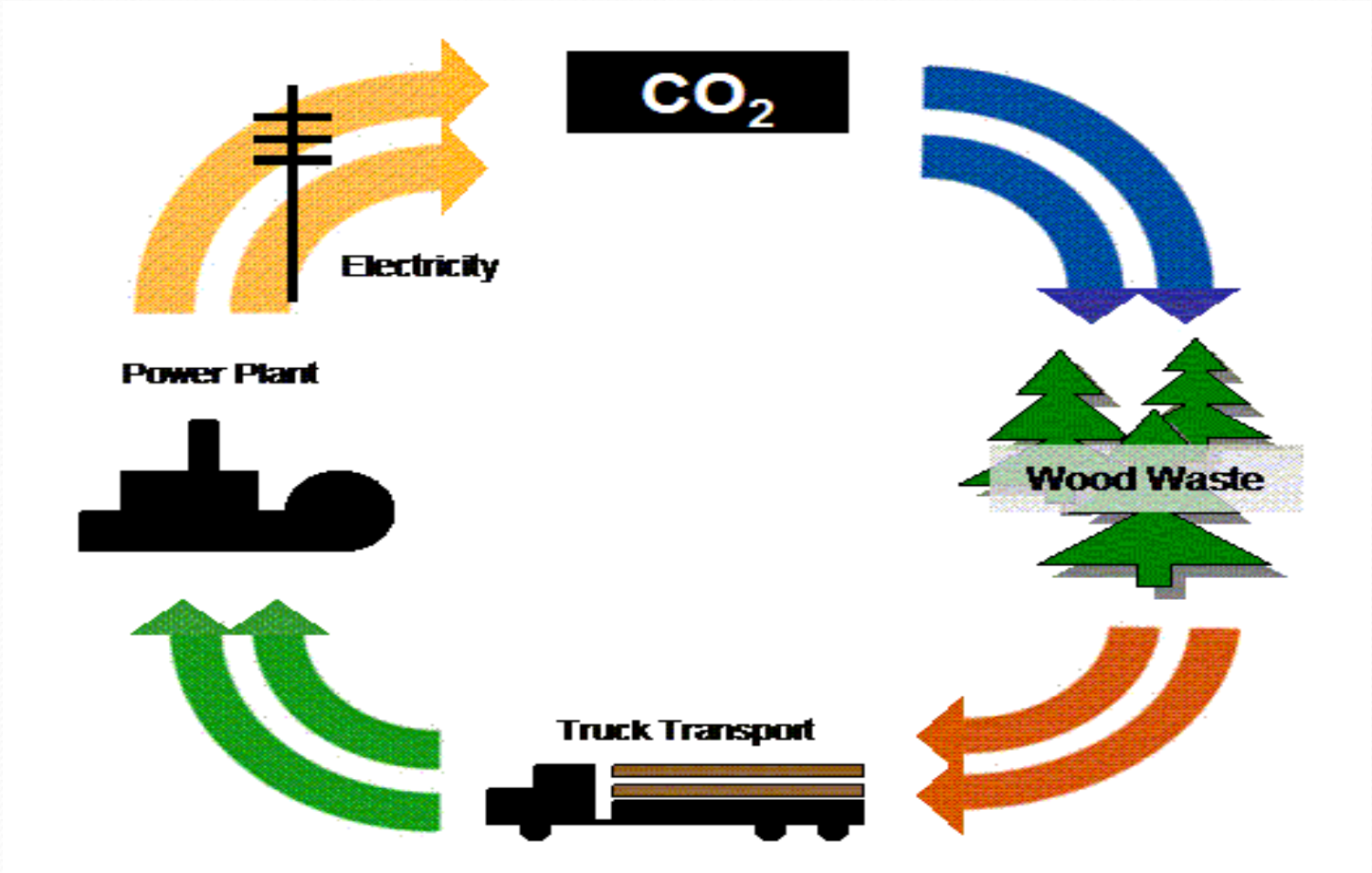
- *For producing heat energy*
- Anything from the nature which can burn to heat.
- E.g. charcoal, wood, Mustard oil

- *For producing electricity*
- Using method is same as oil. Burn it and get energy either for a state or a house.
- E.g. wood, crop residues, Mustard oil

The various and famous examples for biomass

- ***Crop residues :*** burn it in furnace to produce energy.
- ***Burning woods :*** burning woods in order to produce electricity or heat energy.
- ***Mustard oil :*** used like oil for electricity or diesel

Biomass cycle




Sewage
Municipal Solid Waste
Biomass Sources
Agricultural Crops & Residues
Animal Residues
Forestry Crops & Residue
Industrial Residues
Biomass Innovation Centre
Fueling growth through clean technology
educate > develop > implement

Advantages

- Most of them are renewable, e.g., wood, mustard oil and crop residues.
- Solve energy crisis in the future.
- Some of them are re-using the waste, e.g.,crop residues, sewage.
- High energy efficiency.
- Generally it does not polluted the atmosphere as much as oil and coal.

Disadvantages

- More serious air pollution was found when burning plants matters, e.g., CO_2, CO, solid particulate matter.
- Emission more carcinogens into the air.
- Emission some toxic gases and ash.
- Raising the price of food, wood and wood products indirectly.
- May cause accident.
- It uses large area to grow biomass.

Chapter 7

Eco-Friendly Material:-

Recycling is the Process of converting waste materials into new material. It is an alternative to conventional waste disposal. It prevent the waste the waste of potentially useful materials and reduce the consumption of fresh raw materials there by redoing energy usage, air pollution, water pollution. Recycling is an important component of modern waste management. of a material will produce fresh supply of the same material. E.g. paper.

Recycling of glass:- Glass can be recycled infinitely as its structure dose not deteriorate when reprocessed. For recycling glass bottles and tars are collected by curbside collection trucks and bottle banks where the glass collect is taken to a glass recycling plant where is monitored for purity and contaminates are removed. The cullet is crashedand added to a raw material mix in a melting furnace. It is then mechanically blown or molded into new bottles and jars. Glass cullet is also used in the construction industry as glass part. Glass phal is a read-laying material which comprises around 30% recycled glass.

Recycling of aluminum:- Aluminum is one of the most efficient and widely recycled material. All is shredded and ground into small pieces. These pieces are melted in an aluminum smelter to produce molten aluminum. By this stage the recycled aluminum is indicting is liable from virgin Aluminum and further processing is identical for both. This process does not processing any change in the metal and hence aluminum can be recycled indefinitely.

Recycling of Iron and steel:- Iron and steel are the world's most recycled materials. These are among the easiest materials to reprocess as these can be separated magnetically from the waste stream. Recycling is via a steelworks. Scrap is either remitted in an electric are furnace. Any grade of steel can be recycled to top geniality new metal. Steel can be recycled repeatedly.42% of crude steel produced is recycled steel.

Recycling of Timber:-Recycling of timber has become popular due to its image as an environmental friendly product. Consumers commonly believe that purchasing recycle wood will reduce the demand for green timber and will ultimately benefit the environment. Arrival of recycle timber as a construction product has been important in raising awareness among industries and consumers towards deforestation and promoting timber mills to adopt more environmentally friendly practices.

Advantage of great extant because

- Recycling minimize all type pollution's to a great extant because by this process industrial waste products rather than just being thrums angry.
- The major advantage of recycling is that it protects the nature in the must balance way e.g. recycled paper reduced deforestation.
- It is perfectly true that recycling minimize global warming and its grave impacts. The process of recycling involve min. composition and waste is converted into reusable martial with min. harmful impact on the environment.
- Recycling conserves nature resources as it reduces the demand of fresh raw material.
- Recycling of old and used material into reusable products, reduces the possibility of choking landfill sites to a great event.
- Recycling contributes to creation of jobs as the process involved in recycling like collection and delivery are carried out by humans , so this will triggers the opportunities

Disadvantages of Recycling:

- Recycling is not always cost effective sometimes it requires a lot of capital for building up new waste recycling plant, for different kinds of utility vehicles for up a recycling units , for waste and chemical disposal.
- Recycling sites are always unhygienic, unsafe and usely. The harmful chemical from waste are dangerous also there is always danger of infectious diseases.
- The quality of products manufactured from recycled waste may not be up to marks and may be less durable.
- Though recycling plays a vital role in reducing the rate of pollution, but it has not been widely developed.

Green Building:

- Green building is also known as green construction or sustainable building .A green building is one which uses less water optimize energy efficiency, convers nature resources , generates loss waste and provide healthy space for occupants as compared to a conventional building .Indian green building council is leading green building movement in the country.

Thus the concept of green building focuses mainly on two points:-

1. Increasing the efficiently with building use energy water and materials.
2. Reducing building impact on human health and the environment, through better site selection, design, construction, operation, maintenance and removal throughout the complete life cycle.

Components of Green Building:-

1. Site Selection:- Construction green building starts with the proper site selection. The site selected should have easy availability of public transport and conveniences so to cut down the energy consumption for transportation. Also rehabilitation of site damaged by environmental contamination is a better option than any new piece of lend.
2. Materials of Resources:- 1.) sustainable construction material are chosen keeping in mind various properties such as low or zero toxicity, high recyclability, low are zero emissions of harmful gases on the air, durability, reused and recycled products, sustainably harvested materials etc.
   ii) Utilization of rapidly renewable materials such as bamboo flooring, wool carpets, strawboard etc. reduces the use and depletion of finite raw materials.
3. Water efficiency:- I.) Installing water efficient or low water flow equipment's in kitchens and bathrooms to reduce water consumption.
   ii) incorporating waste water management techniques like dual plumbing for using recycled water in toilet flashing or using water conserving fixtures such as low flow shower heads, self-closing nozzles on hoses, water closets with dual flush options.
   iii) Use of micro irrigation techniques are site instead of high sprayers.
   iv) Recirculation system for centralized hat water distribution.
   v.) integrating rain water harvesting system in building design to ensure maximum possible urination of rain water.
   Benefits of Green Buildings:- with the constant development of new technologies to complement current practices in creating greener structures, the benefits of green building can range from environmental to economic to social.
   Benefits of green building are as follow:
   1. Environmental Benefits:-
      i) Reduce wastage of water
      ii) Conserve natural resources
      iii) Improve air and water quality
      iv) Protect biodiversity and ecosystem
   2. Economic Benefits:-
      i) Reduce operating casts
      ii) Improve occupant productivity
      iii) Create market for green products and services
   3. Social Benefits:-
      i) Improve quality of life
      ii) Minimize strain on local infrastructure
      iii) Improve occupant health and comfort