INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

DUNDIGAL, HYDERABAD - 500 043

ELECTRICAL AND ELECTRONICS ENGINEERING

POWER POINT PRESENTATION
Environmental Studies

III B. Tech II semester (JNTUH-R15)

Prepared by:
Mr. V.S.K. PRASADA RAO,
Associate Professor

unit-i
Ecosystems

What is Ecology?

- Ecology is the study of relationships between living things and between living things and their environment.

What is an ecosystem?

- Ecosystem is a system of living things that interact with each other and with the physical world.

- A Biome is a collection of related ecosystems.

Main Ecosystems:

- Desert
- Rainforest
- Ocean
- Taiga
- Tundra
- Chaparral
- Grassland
- Temperate Forrest

Green:Grassland Purple: Taiga Orange:Tundra Black:Temperate Forrest Yellow:Desert Brown:Chapparal White:Ocean

However……..

- An ecosystem can be as large as the Sahara Desert, or as small as a puddle!!!
- Ecosystems are more than just the organisms they contain. Geography, weather, climate and geologic factors also influence the interactions within an ecosystem.

Abiotic Factors

- Are nonliving physical factors of an environment.

- Abiotoic Factors include amount of water and oxygen, temperature, amount of sunlight and water pressure.

Biotic Factors

- Are the living, physical factors of an environment.

- Examples of Biotic Factors are parasitism, disease and predation.

Balance

- Ecosystems will fail if they do not remain in balance.
- No community can carry more organisms than its food, water and shelter can accommodate.

How do they stay balanced?

- To succeed in an ecosystem, plants and animals have special structures and behaviors called adaptations.
- Ex) Chameleon

  Polar Bear

Can you think of more examples of adaptation?

What is an ecosystem?

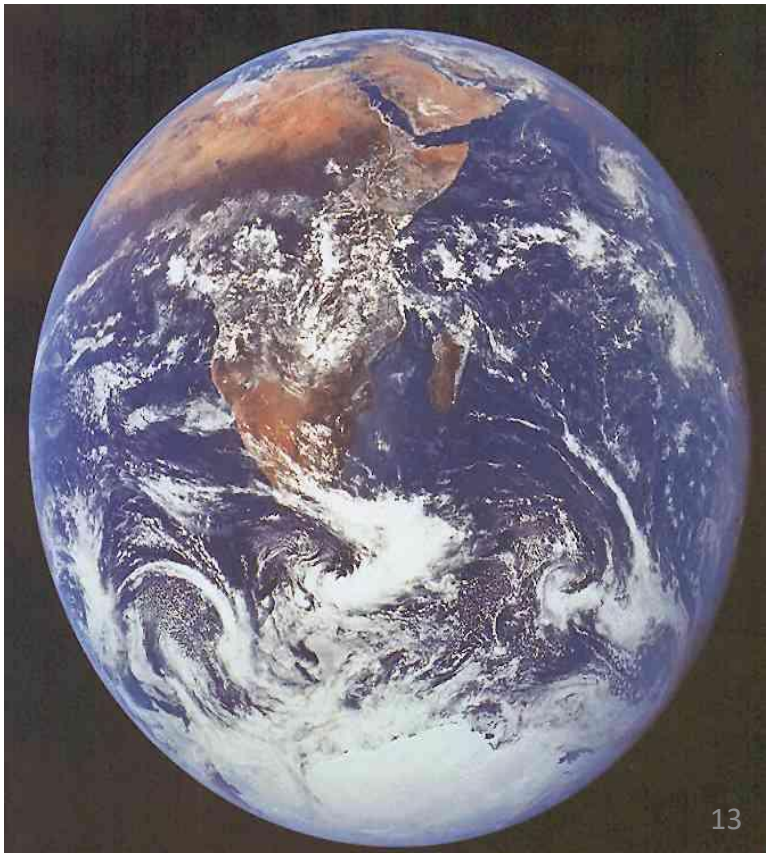
- System = regularly interacting and interdependent components forming a unified whole

- Ecosystem = an ecological system;

  = a community and its physical environment treated together as a functional system

OR, MORE SIMPLY

- an ecosystem is composed of the organisms and physical environment of a specified area.
- SIZE: micro to MACRO



THE RULES OF ECOLOGY

- F. A. BAZZAZ:
- 1. Everything is connected to everything else.
- 2. Everything must go somewhere.
- 3. There is no such thing as a free lunch.

- *H. T. Odum:*

- To understand any system you must understand the next larger system.

Attributes of Ecosystems

- Order
- Development
- Metabolism (energy flow)
- Material cycles
- Response to the environment
- Porous boundaries

- Emphasis on function, not species

ENERGY FLOW IN ECOSYSTEMS

- All organisms require energy,

for growth, maintenance, reproduction, locomotion, etc.

- Hence, for all organisms there must be:
- A source of energy
- A loss of usable energy

Types of energy

- heat energy
- mechanical energy (+gravitational energy, etc.)
- chemical energy = energy stored in molecular bonds

Transformations of energy

- How is solar energy converted to chemical energy?
- How does this process influence life as we see it on earth?
- The transformations of energy from solar radiation to chemical energy and mechanical energy and finally back to heat are a traditional topic of Ecosystem Ecology.

An ecosystem has abiotic and biotic components:

- ABIOTIC components:
- Solar energy provides practically all the energy for ecosystems.
- Inorganic substances, e.g., sulfur, boron, tend to cycle through ecosystems.
- Organic compounds, such as proteins, carbohydrates, lipids, and other complex molecules, form a link between biotic and abiotic components of the system.

- BIOTIC components:

- The biotic components of an ecosystem can be classified according to their mode of energy acquisition.

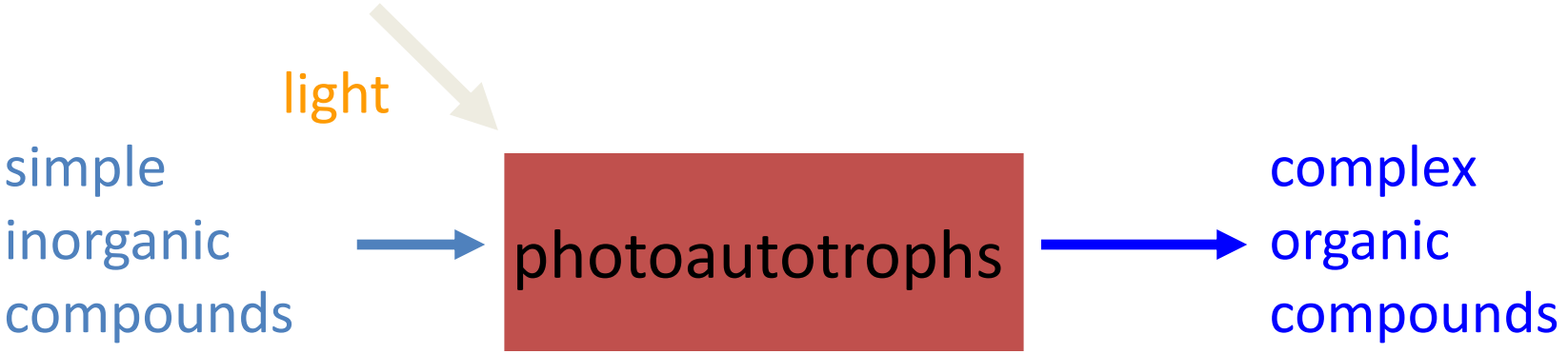
- In this type of classification, there are:

- Autotrophs
- Saprotrophs and
- Heterotrophs

Autotrophs

- Autotrophs (=self-nourishing) are called primary producers.

- Photoautotrophs fix energy from the sun and store it in complex organic compounds
- (= green plants, algae, some bacteria)



- Chemoautotrophs (chemosynthesizers) are bacteria
- that oxidize reduced inorganic substances
- (typically sulfur and ammonia compounds)
- and produce complex organic compounds.

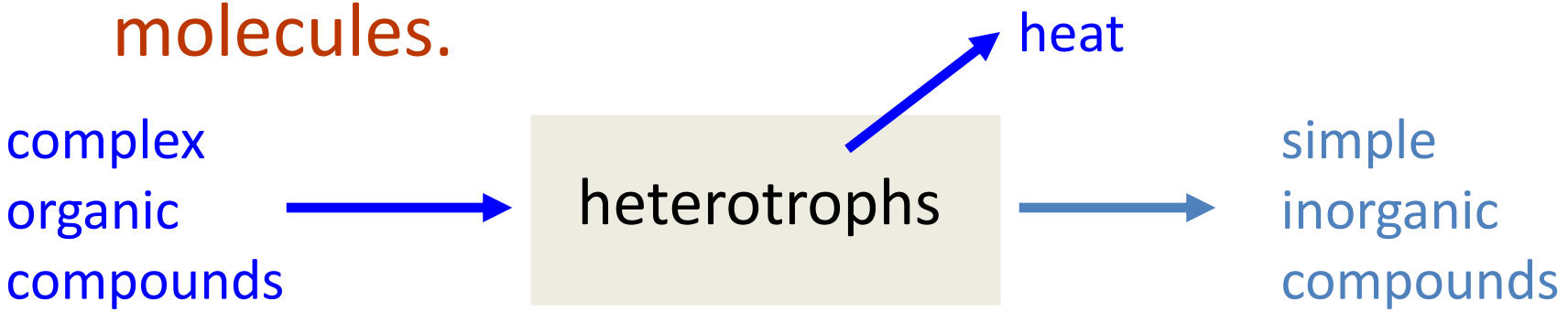
Chemosynthesis near hydrothermal vents

Other chemoautotrophs:

Nitrifying bacteria in the soil under our feet!

Heterotrophs

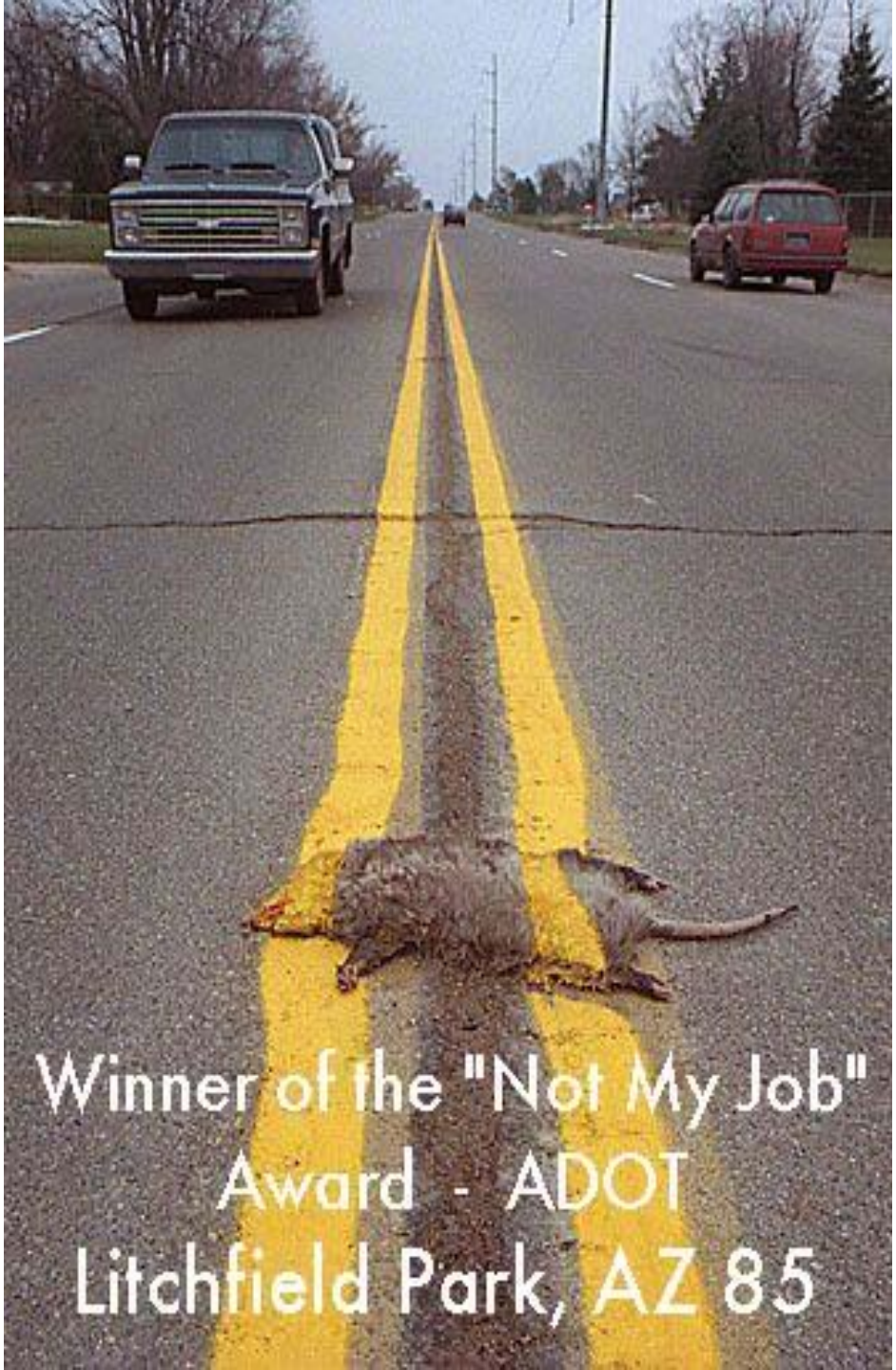
- Heterotrophs (=other-nourishing) cannot produce their own food directly from sunlight+ inorganic compounds. They require energy previously stored in complex molecules.



(this may include several steps, with several different types of organisms)

- Heterotrophs can be grouped as:
- consumers
- decomposers

- Consumers feed on organisms or particulate organic matter.
- Decomposers utilize complex compounds in dead protoplasm.
- Bacteria and fungi are the main groups of decomposers.
- Bacteria are the main feeders on animal material.
- Fungi feed primarily on plants, although bacteria also are important in some plant decomposition processes.


Winner of the "Not My Job"
Award - ADOT
Litchfield Park, AZ 85

The Laws of Thermodynamics

- Energy flow is a one-directional process.

- sun---> heat (longer wavelengths)

- FIRST LAW of THERMODYNAMICS:

- Energy can be converted from one form to another, but cannot be created or destroyed.

SECOND LAW of THERMODYNAMICS

- Transformations of energy always result in some loss or dissipation of energy

r

- In energy exchanges in a closed system, the potential energy of the final state will be less than that of the initial state

or

- Entropy tends to increase (entropy = amount of unavailable energy in a system)

- Systems will tend to go from ordered states to disordered states (to maintain order, energy must be added to the system, to compensate for the loss of energy)

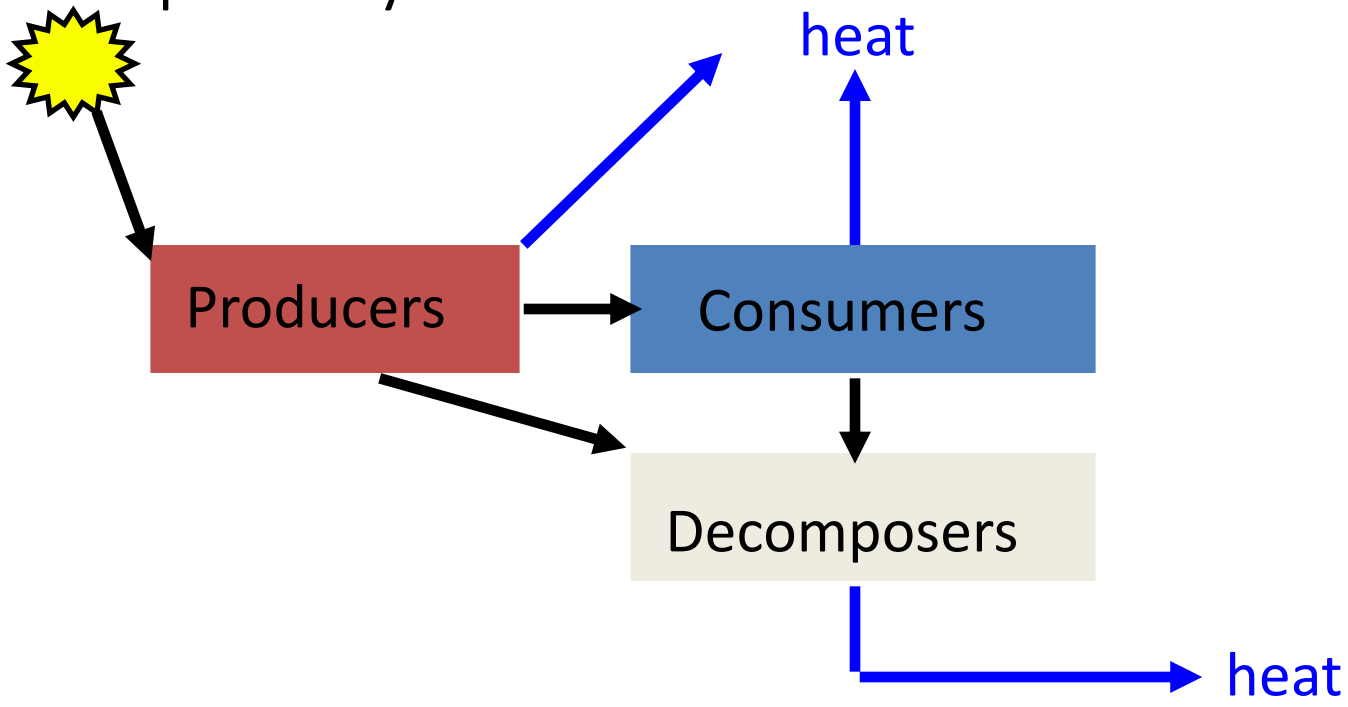
Examples

- Internal combustion engines in cars are 25% efficient in converting chemical energy to kinetic energy; the rest is not used or is lost as heat.

- My house, particularly my girls' rooms, goes from a complex, ordered state to a simpler, disordered state.

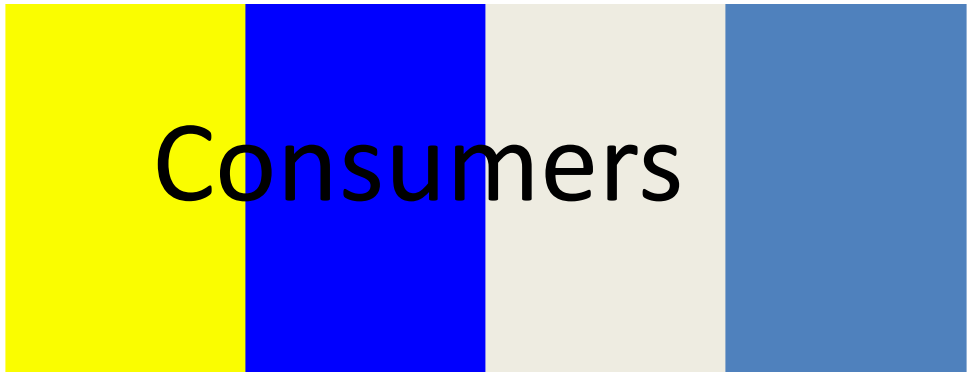
Energy flow

- Simplistically:



- This pattern of energy flow among different organisms is the TROPHIC STRUCTURE of an ecosystem.

- It is useful to distinguish different types of organisms within these major groups, particularly within the consumer group.



Terminology of trophic levels

- We can further separate the TROPHIC LEVELS, particularly the Consumers:
- Producers (Plants, algae, cyanobacteria; some chemotrophs)--capture energy, produce complex organic compounds
- Primary consumers--feed on producers
- Secondary consumers--feed on primary consumers
- Tertiary consumers--feed on secondary consumers

More trophic levels:

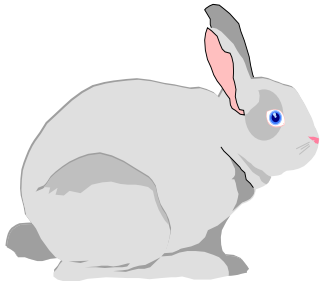
- Detritivores--invertebrates that feed on organic wastes and dead organisms (detritus) from all trophic levels

- Decomposers--bacteria and fungi that break down dead material into inorganic materials

Alternate Terminology

- Producers = plants etc. that capture energy from the sun
- Herbivores = plant-eaters
- Carnivores = animal-eaters
- Specialized herbivores:
- Granivores--seed-eaters
- Frugivores--fruit-eaters

- Together, these groups make up a FOOD CHAIN
- E.g., grass, rabbit, eagle



Carnivore Herbivore Producer

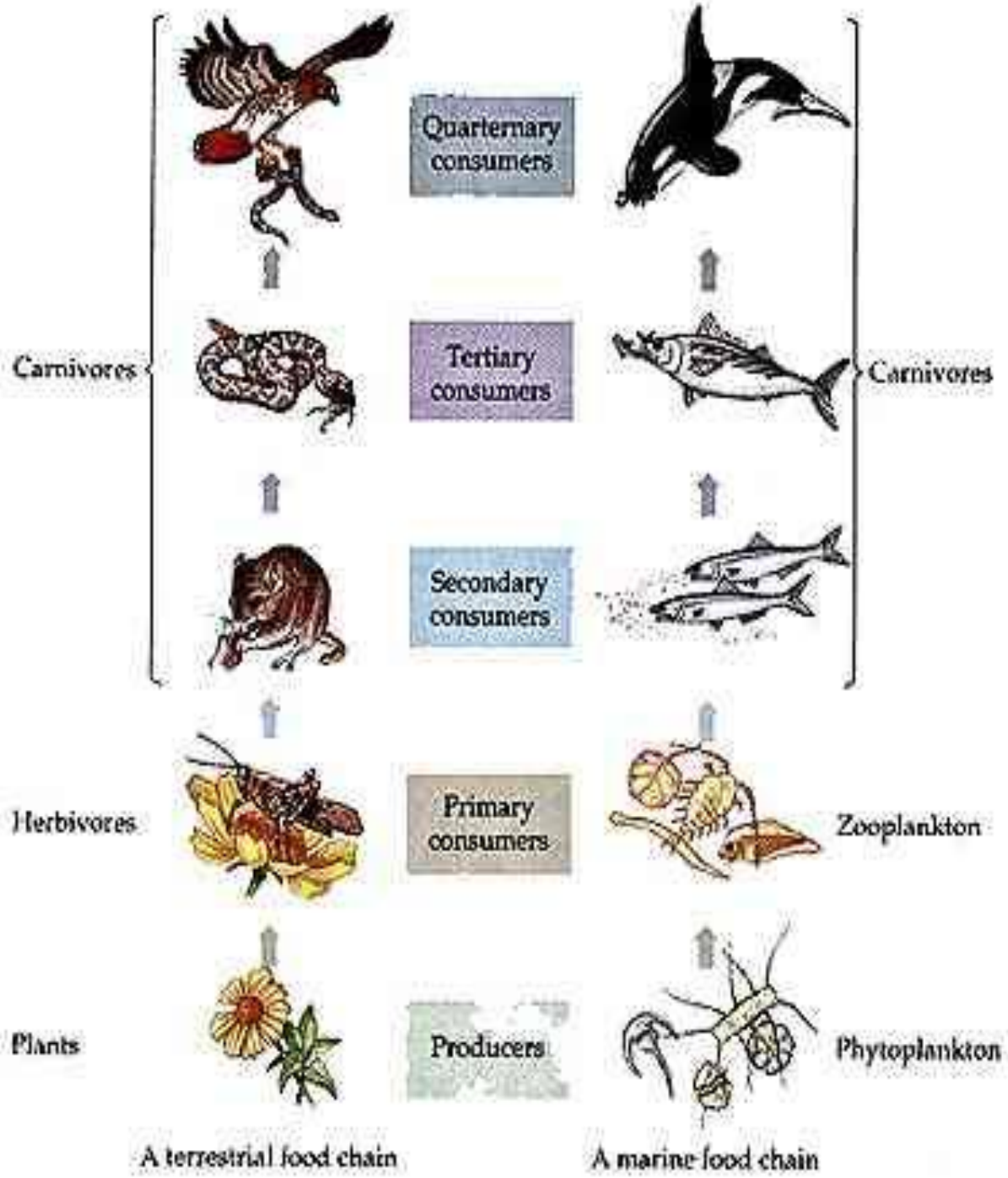
Carnivores

- Carnivores can be further divided into groups:

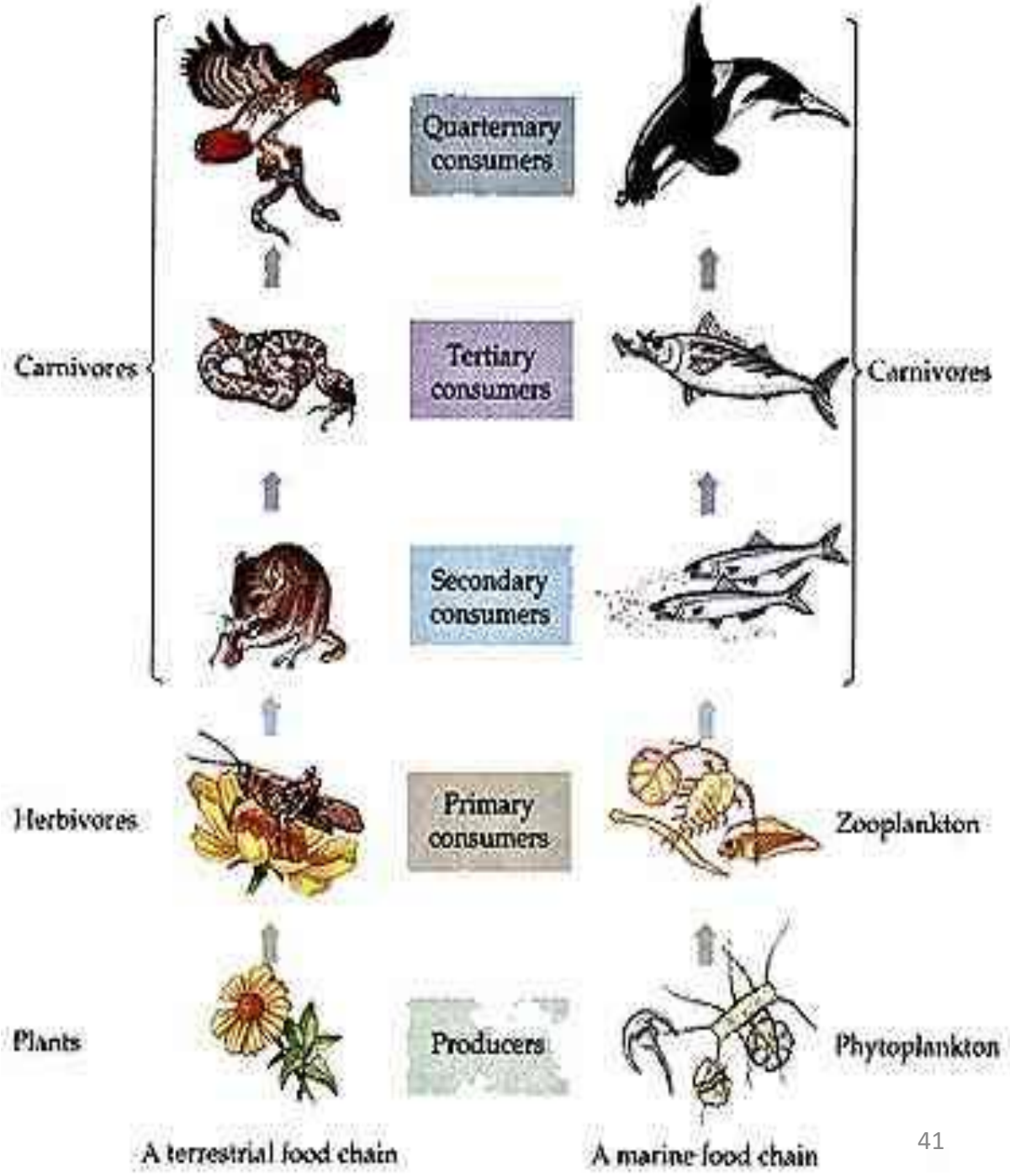
quaternary carnivore (top)

- tertiary carnivore
- secondary carnivore
- primary carnivore

- The last carnivore in a chain, which is not usually eaten by any other carnivore, is often referred to as the top carnivore.

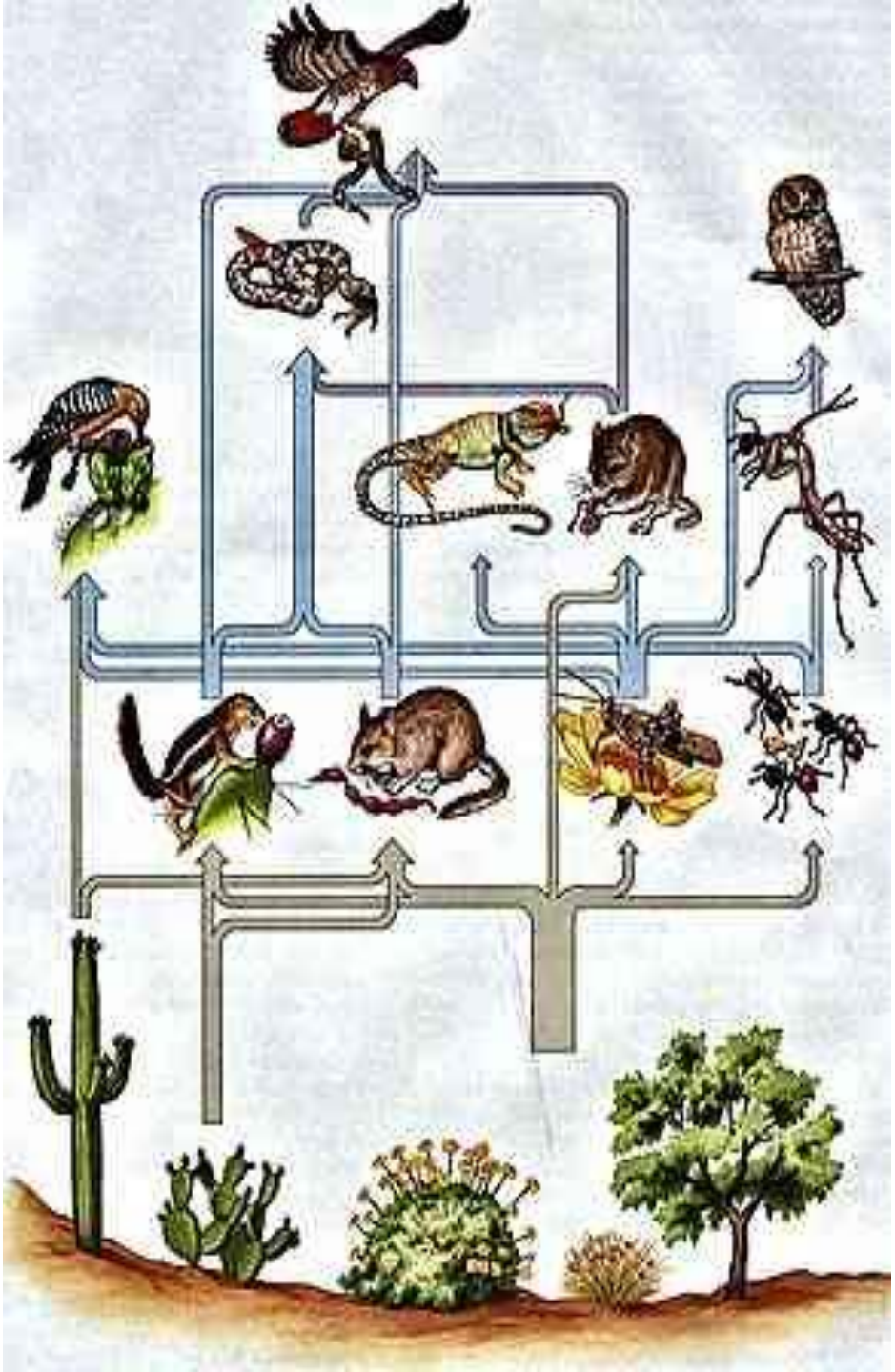

Quarternary consumers
Tertiary consumers
Secondary consumers
Primary consumers
Producers
Carnivores
Carnivores
Herbivores
Zooplankton
Plants
Phytoplankton
A terrestrial food chain
A marine food chain

- Too simplistic
- No detritivores
- Chains too long



- Rarely are things as simple as grass, rabbit, hawk, or indeed any simple linear sequence of organisms.

- More typically, there are multiple interactions, so that we end up with a FOOD WEB.



Energy transfers among trophic levels

- How much energy is passed from one trophic level to the next?

- How efficient are such transfers?

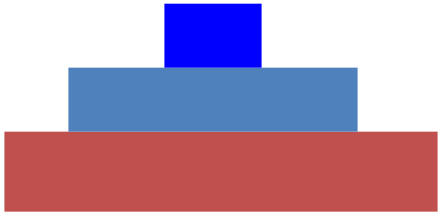
- Biomass--the dry mass of organic material in the organism(s).

he mass of water is not usually included, since water content is

- Standing crop--the amount of biomass present at any point in time.

Ecological pyramids

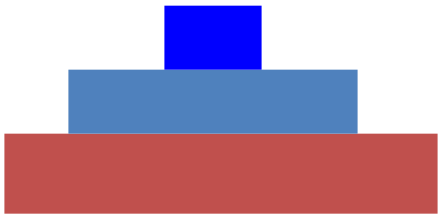
- The standing crop, productivity, number of organisms, etc. of an ecosystem can be conveniently depicted using “pyramids”, where the size of each compartment represents the amount of the item in each trophic level of a food chain.



- Note that the complexities of the interactions in a food web are not shown in a pyramid; but, pyramids are often useful conceptual devices--they give one a sense of the overall form of the trophic structure of an ecosystem.

Pyramid of energy

- A pyramid of energy depicts the energy flow, or productivity, of each trophic level.
- Due to the Laws of Thermodynamics, each higher level must be smaller than lower levels, due to loss of some energy as heat (via respiration) within each level.



Energy flow in :

carnivores

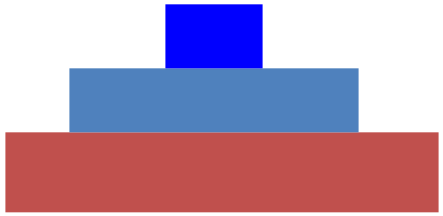
herbivores

producers

Pyramid of numbers

- A pyramid of numbers indicates the number of individuals in each trophic level.

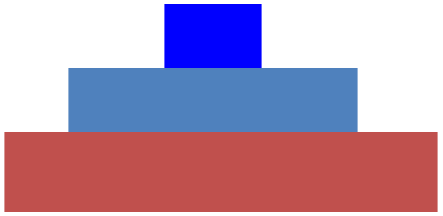
- Since the size of individuals may vary widely and may not indicate the productivity of that individual, pyramids of numbers say little or nothing about the amount of energy moving through the ecosystem.



# of carnivores
# of herbivores
# of producers

Pyramid of standing crop

- A pyramid of standing crop indicates how much biomass is present in each trophic level at any one time.
- As for pyramids of numbers, a pyramid of standing crop may not well reflect the flow of energy through the system, due to different sizes and growth rates of organisms.

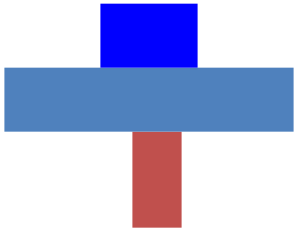


biomass of carnivores
biomass of herbivores
biomass of producers

(at one point in time)

Inverted pyramids

- A pyramid of standing crop (or of numbers) may be inverted, i.e., a higher trophic level may have a larger standing crop than a lower trophic level.
- This can occur if the lower trophic level has a high rate of turnover of small individuals (and high rate of productivity), such that the First and Second Laws of Thermodynamics are not violated.



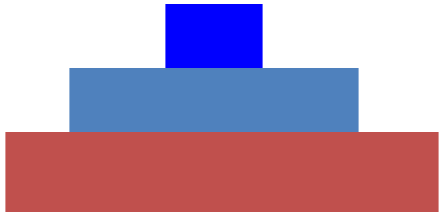
biomass of carnivores
biomass of herbivores
biomass of producers

(at one point in time)

Pyramid of yearly biomass production

- If the biomass produced by a trophic level is summed over a year (or the appropriate complete cycle period), then the pyramid of total biomass produced must resemble the pyramid of energy flow, since biomass can be equated to energy.

Yearly biomass production (or energy flow) of:



carnivores

herbivores

producers

- Note that pyramids of energy and yearly biomass production can never be inverted, since this would violate the laws of thermodynamics.

- Pyramids of standing crop and numbers can be inverted, since the amount of organisms at any one time does not indicate the amount of energy flowing through the system.

- E.g., consider the amount of food you eat in a year compared to the amount on hand in your pantry.

Examples of food webs

- the North Sea
- a hypothetical web--effects on species diversity

Examples of pyramids

- Terrestrial and fresh-water communities
- Ocean communities--English Channel

UNIT-II
NATURAL RESOURCES

What are Natural Resources?

- Natural resources occur naturally within environments
- Natural resource is often characterized by amounts of biodiversity and geo diversity existent in various ecosystems.
- Any material which is part of earth and satisfy human need and add value is called as resource. Example: rocks, minerals, soil, rivers, plants & animal.
- Human is a resource because developing his skill, he can develop other resource by adding value to the physical material .

Source: www.slideshare.net/naturalresource

Value of Natural Resources

- Economic value- Production of things from natural resources
- Legal value- Clean air, Fresh water, Healthy animal and human beings
- Aesthetic value- Beauty of village, roads, ponds and their agricultural fields

Types of Natural Resources

- **BIOTIC** : Resources which are living in nature. Example: Forests ,Animals etc.

- **A BIOTIC** : Resources which are non-living in nature. Example: Air ,Water etc.

- **OTHERS RENEWABLE** : Resources which can be replenished easily. Example: Sunlight

Study of Natural Resource at Ahirori Block

NATURAL RESOURCE	FORM	INSTITUTIONS	STAKEHOLDERS		POWERS	HOW STAKEHOLDERS ARE AFFECTED OR HOW THEY ARE AFFECTING N.R	CHALLENGES / ISSUES	CULTURAL ISSUES / TRADITIONAL ASPECT	CONFLICTS
			Direct	Indirect					
1. Water	Pond, River, Canal, Well, Lake, Ground Water	Department of Water management, Department of Irrigation Uttar Pradesh	Villagers, Farmers, Fisherman & Washer man	Department of Irrigation	Gram Pradhan and their colleagues	Stakeholders are benefiting but they are polluting water and excess using of ground water	Challenges: Give the irrigation and drinking facility to every villagers Issue: Every farmers are not benefiting from canal for irrigation	Villagers disposed their worship materials in rivers, Canal and Well	Ownership of Canal water
2. Plants	Vegetables, Fruits, Herbs, Flowers, Shrubs, Trees & Houseplants	KVK, Department of Agriculture, Uttar Pradesh Forest Corporation	Input Suppliers, Villagers, Farmers, Gardeners, Consumers, Woodcutters, Carpenters, Animals &	Traders, Retailers, Food Processing, Timbers and Pharmaceuticals Industries	Villagers and Farmers	Increasing income but decrease Tree day by day	Challenge: More Profit in less investment Issue: No Market linkage	Some plants are used in worship, rituals and Rites like Neem, Tulsi, Peepal etc.	Cannot plant tree in Gram Samaaj land because it is public property

			Birds						
3. Animals	Pets & Wilds	Department of Animals Husbandry	Villagers, Farmers, Butcher, Scavenger, Carnivores	Animal Merchants, End Consumers	Villagers and Farmers	Increasing income and getting more value for their livelihoods	Challenge: More Profit with investment Issue: No Market linkage	Some animals are worshiped like Cow.	None
4. Air	O_2, Co_2, No_2 etc.	None	Every living beings	None	None	Air pollution	None	None	None
5. Land & Soil	Agricultural land, Wasteland, Fallow land, Grazing land etc.	Department of Agriculture, KVK	Input Suppliers, Villagers, Farmers, Animals	End Users, Traders, Retailers, Food Processing Units	Villagers and Farmers	Stakeholders are benefiting but they are polluting their soil from excess using of pesticides and chemicals	Challenge: More Profit with investment Issue: No Market linkage	None	Ownership of Land specially Public land
6. Sun Energy	Sunlight	Gopal Solar Lamp, Kanpur	Every living beings	None	None	None	None	None	None

FOREST

- In Ahirori, there are no forest but some villagers have planted Mango, Eucalyptus, Popular, Sagaun etc in their own field for commercial purpose.
- For this some local level traders support him for growing such trees in their own land for commercial purpose only.
- Uttar Pradesh Forest Corporation also plants Shrubs plant in public land every year but people can care of it because they don't aware for natural resources in their future.

SOLAR LIGHT

- **In Ahirori, The Solar street lights are being setup which is under " 13th Vitta Yojaya" in year 12-13.**
- **There are some private companies who have entered into the solar light business where they collect larteins in morning and charge them in their grid station and dispatch in evening to each household.**
- **They only have to pay minimal cost of Rs 100 per month. So this model saves environment and even money burns in buying kerosene oil for lightening.**

Soil / Land Resources

- In the area of study the soil was found very productive as availability of water is excellent.
- The pulses grown there are good in quality and quantity wise.
- The agricultural land is large than other lands like grassing land & fallow land.
- Soils are getting polluted day by day by excess use of fertilizer and pesticides.

Water Resources

- In the natural resources, Ahirori is very rich in water resources like Wells, Canal, Ponds, Mini Lake, Rivers etc.
- Generally wells are private property there but Canal, Ponds, Rivers and Mini Lake are public property.
- Department of Water management, Department of Irrigation Uttar Pradesh are major institutions, who manage the water resources.

ANIMALS

- Animals are major resource of livelihood after agriculture.
- In the wild animals, Nilgai and Jackal is a most populated animal who's affected negatively to farmers.
- The quality and population of pet animal are increasing day by day for only commercial propose.
- Fodders are getting polluted day by day by excess use of fertilizer and pesticides. This is directly impacting to animals.

Resource: www.google.co.in

Uses of Natural Resources

Natural Resources	Uses
Air (Wind)	Required for all living things for breathing, Use to produce wind energy.
Animals / Plants	Provide food, cloth, shelter, medicine. Used as mode of transport. Animal dung can be used as fuel/fertilizer.
Soil	Used as the primary nutrient source for plants. It is the habitat of many organisms.
Solar Light	Provide light, energy and help to plants for making their foods
Wood / Tree	Used as construction material. Used to make utensils, furniture and sporting equipments.
Water	Used in household, agriculture and transportation.

Major problems with Natural Resource conservation

- Low awareness for conservation of natural resources.
- Exploitation of living natural resources for economic gain.
- Values and knowledge about the species and ecosystem inadequately known.
- Unplanned urbanization and uncontrolled industrialization.

Major Natural Resource threats

- Habitat destruction
- Extension of agriculture
- Filling up of wetlands
- Conversion of rich bio-diversity site for human settlement and industrial development
- Uncontrolled commercial exploitation

FLOOD


FLOOD

Policy gaps

- **Lack of policies for protection of wetlands, grasslands and other areas.**

- **Inadequate enforcement of existing laws**

- **Inadequate implementation of eco-development programmers**

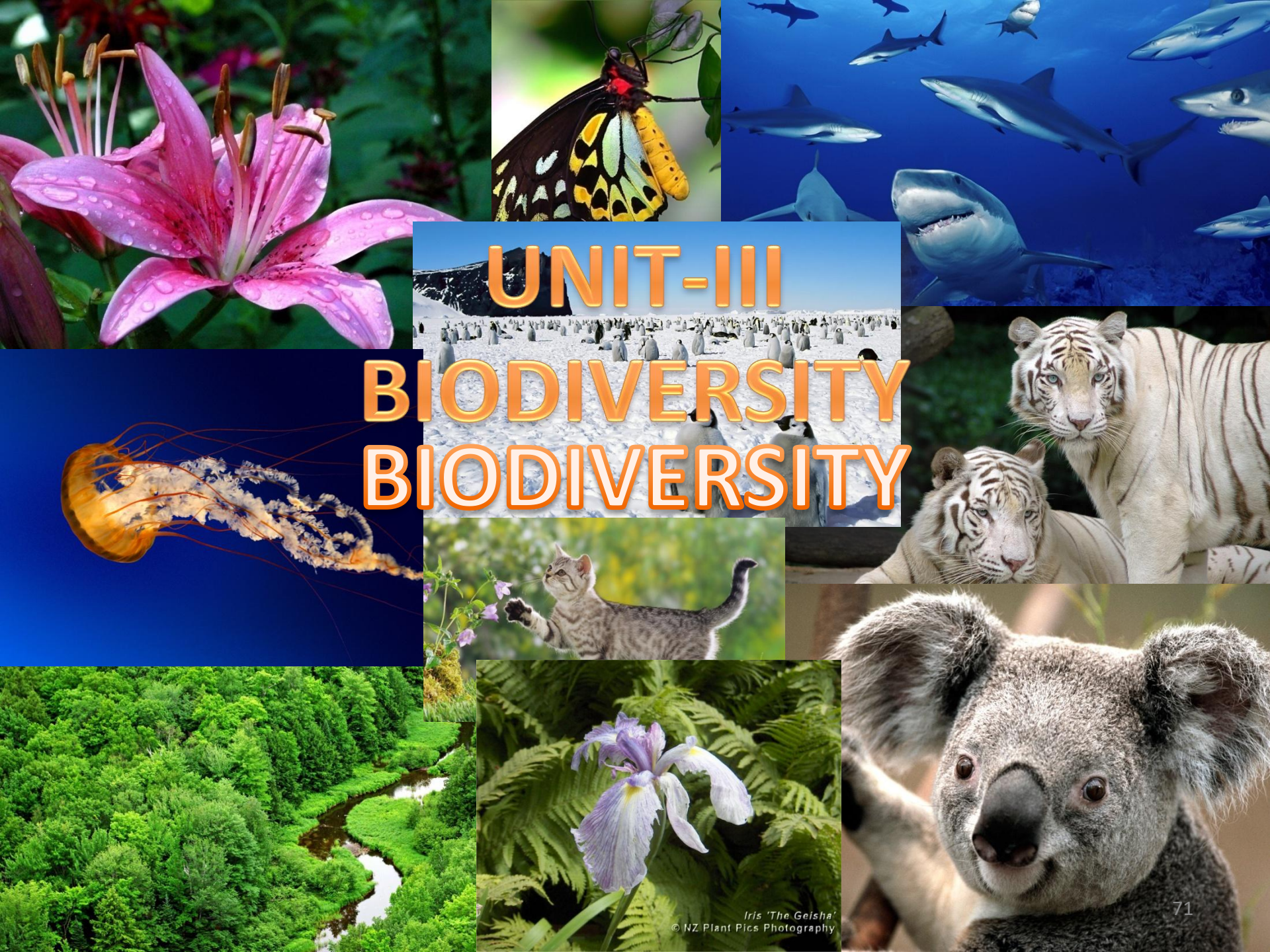
- **Need for enhanced role of NGOs and other institutions**

- **Need for political commitment and good will.**

- **Need for providing Institutional support like Banks, FI**

- **Lack of Local community participation**


Think Green
INDIA


UNIT-III
BIODIVERSITY
BIODIVERSITY
Iris 'The Geisha'
© NZ Plant Pics Photography

Biodiversity

What does "Bio" means?

Bio = Life

Biodiversity

What does "Diversity" means?

Diversity = Variety

There are three types of biodiversity

- Diversity of Species
- Diversity of Ecosystem
- Diversity of Genes

BIODIVERSITY AND BALANCE OF NATURE

- **Tropic Level**: Elimination of species from tropic level can cause destruction of ecosystem as well as biodiversity.

- **Complex Ecosystem:** In a complicated ecosystem having several tropic levels, loss of one or more spices do not cause any serious problem because the alternative available.

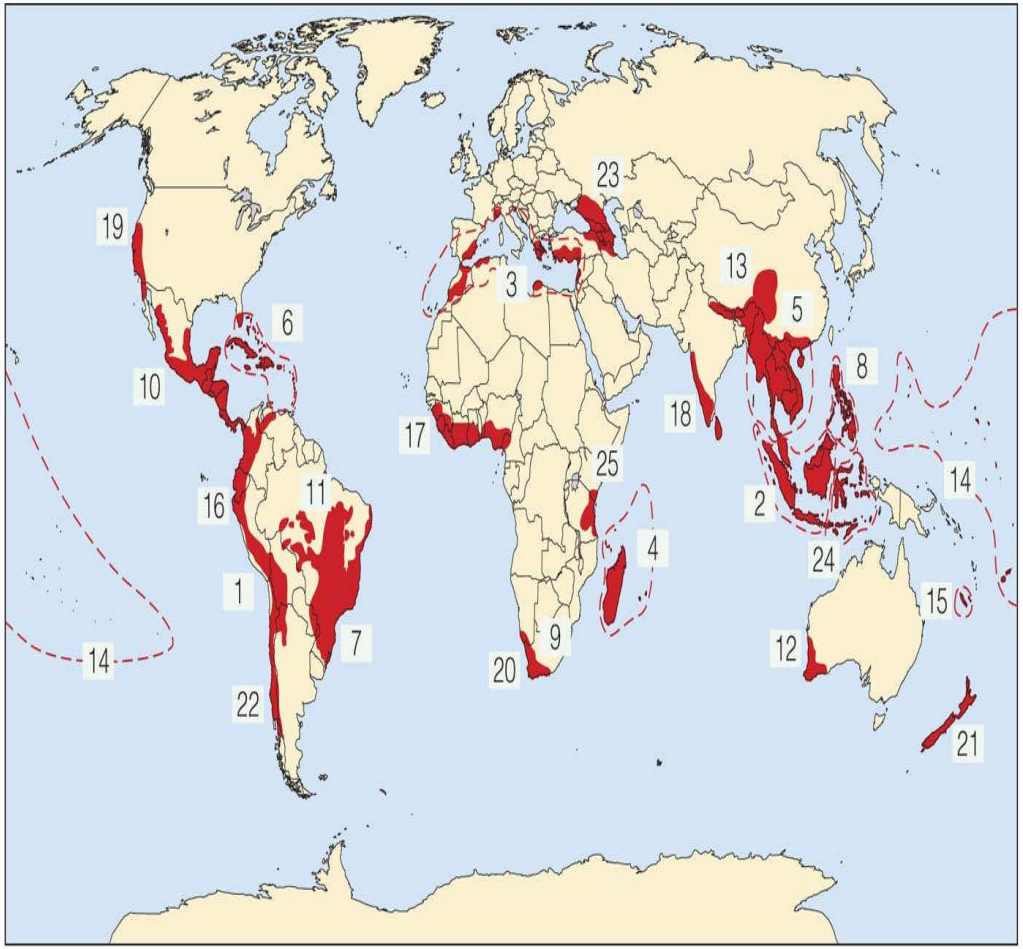
BENEFITS OF BIODIVERSITY

- **Consumptive value:**
  - Food/Drink
  - Fuel
  - Medicine
  - Better crop varieties
  - Industrial Material
- **Productive use**
- **Social use**
- **Ethical use**
- **Aesthetic use**
- **Intrinsic value**

DISTRIBUTION OF BIODIVERSITY

- Flora and fauna diversity depends on-
  - Climate
  - Altitude
  - Soils
  - Presence of other species
- Most of the biodiversity concentrated in Tropical region.

- **BIODIVERSITY HOTSPOTS**:
  - A region with high biodiversity with most of spices being Endemic.
  - India have two Biodiversity Hotspots- East Himalayan Region and Western Ghat.



THREATS TO BIODI

- Habitat Loss
- Wild Life
- poaching
- Man-Wildlife
- Conflicts

Poaching of Wild Life

Elephant Tusk

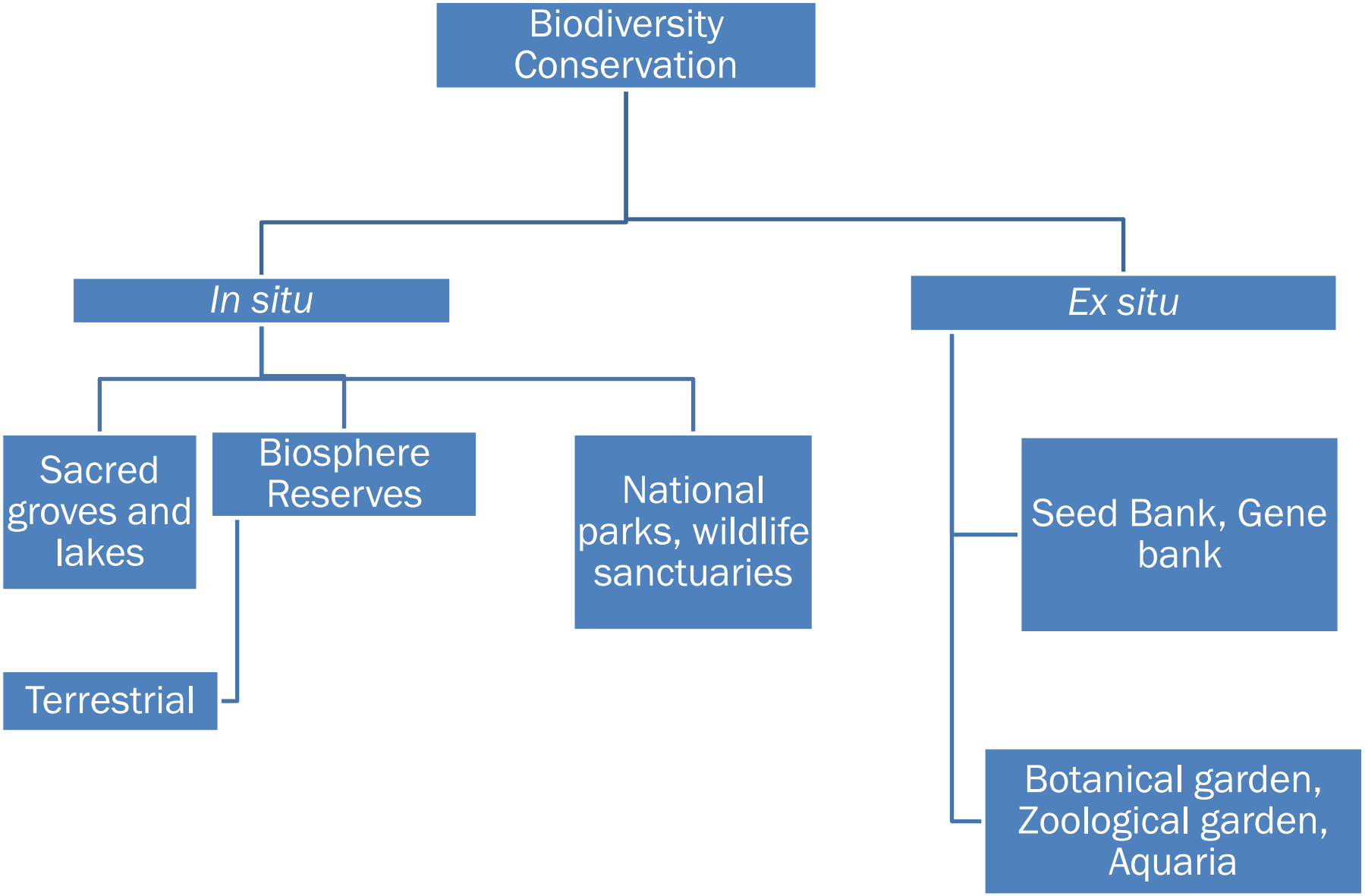
Man-Wild Life Conflicts


STOP

CONSERVATION OF BIODIVERSITY

- ***In situ*** conservation
  - Protected areas (National Parks and Sanctuaries)
  - Biosphere Reserves
  - Sacred Forest and Sacred Lakes

- ***Ex situ*** conservation
  - Seed Bank, Gene Bank, Pollen Bank, DNA Bank


Biodiversity Conservation
In situ
Ex situ
Sacred groves and lakes
Biosphere Reserves
National parks, wildlife sanctuaries
Terrestrial
Seed Bank, Gene bank
Botanical garden, Zoological garden, Aquaria

National parks and wild life Sancturies in India

Kanha National Park

Gir National Park

Corbett National Park

Kaziranga National Park

Ranthambore National Park


TAMIL NADU
FOREST DEPT
INDIRA GANDHI WILDLIFE SANCTUARY
AND
NATIONAL PARK
WELCOMES YOU
WILD LIFE AREA
DRIVE SLOWLY AND SAFELY
DO NOT TEASE OR GO NEAR ANIMALS
DO NOT THROW PLASTIC BAGS CONTAINERS
DO NOT PARK YOUR VEHICLES
ANIMAL CROSSING AREAS

Feel Wild Adventure in Your Life

Top 10 Wildlife Sanctuaries in India

Wildlife Sanctuary is a natural shelter for wild species, which provide protection to wild animals from hunting ground & hunting spider.

For more information visit here - >

http://www.india-wildlifetours.com

Ex-Situ Conservation

ZOO

Gene Bank

Conserving cowpea

Botanical Gardens

Conservation of seeds

Food Resources

Fodder Resources

Timber forest Products

Non-Timber Forest Products

CONCLUSION

Biodiversity is our life. If the Biodiversity got lost at this rate then in near future, the survival of human being will be threatened. So, it is our moral duty to conserve Biodiversity as well our Environment. Long-term maintenance of species and their management requires co-operative efforts across entire landscapes. Biodiversity should be dealt with at scale of habitats or ecosystems rather than at species level.

UNIT-IV
AIR POLLUTION

- Any visible or invisible particle or gas found in the air that is not part of the original, normal composition.

CLASSIFICATION OF AIR POLLUTANTS:

PRIMARY POLLUTANTS:

These are emitted directly from the point source.

EXAMPLES:

- CARBON MONOXIDE
- OXIDES OF NITROGEN
- OXIDES OF SULPHUR
- HYDROCARBONS

SECONDARY POLLUTANTS

These are formed by interaction of primary pollutants with other primary pollutant (or) with some natural constituents of atmosphere.

EXAMPLES:

OZONE

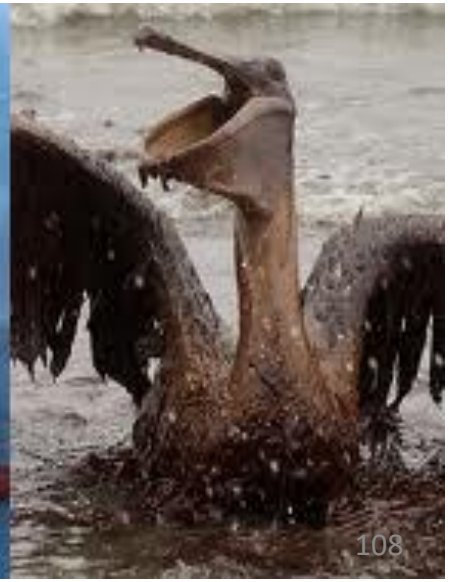
PEROXY ACETYL NITRATE (PAN)

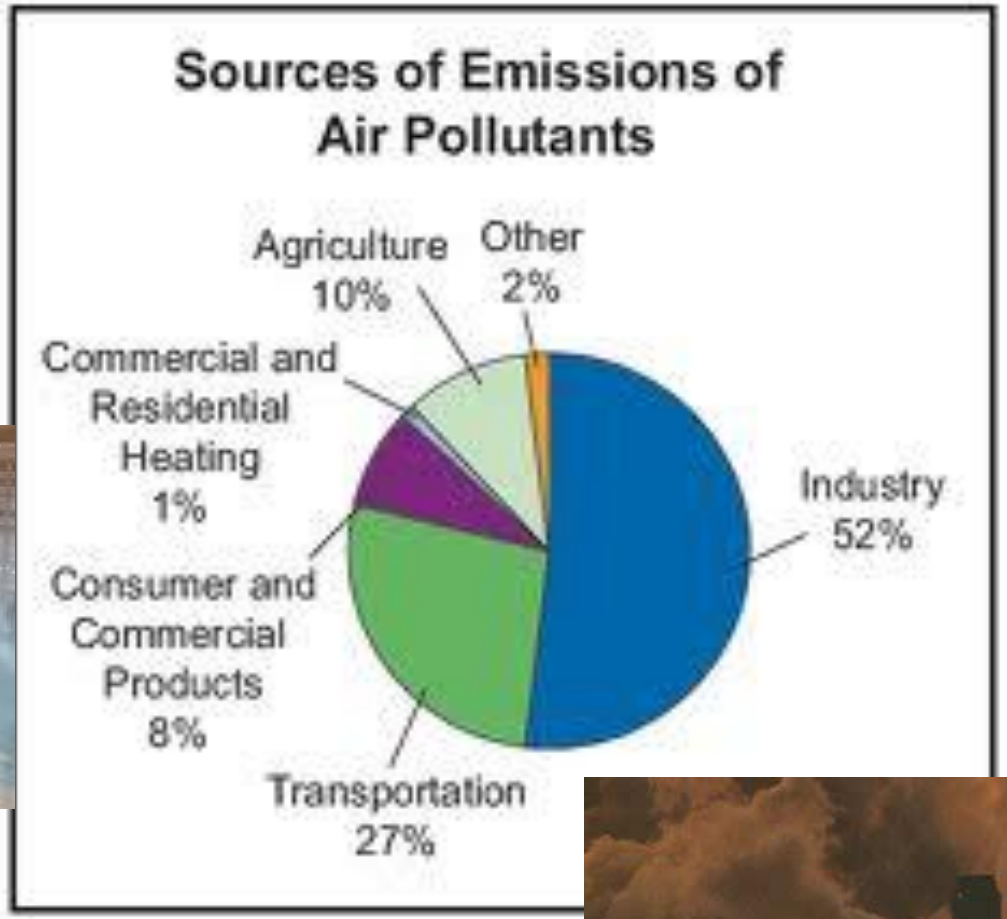
PHOTOCHEMICAL SMOG etc

SOURCES OF AIR POLLUTION

Natural: forest fires, pollen, dust storm

Unnatural: man-made; coal, wood and other fuels used in cars, homes, and factories for energy




Sources of Emissions of Air Pollutants
Agriculture 10%
Other 2%
Commercial and Residential Heating 1%
Industry 52%
Consumer and Commercial Products 8%
Transportation 27%

5 Major Pollutants:

1..) Carbon Monoxide

2.) Sulfur Dioxide

3.) Nitrogen Dioxide

4.) Particulate Matter

5.) Ground Level Ozone

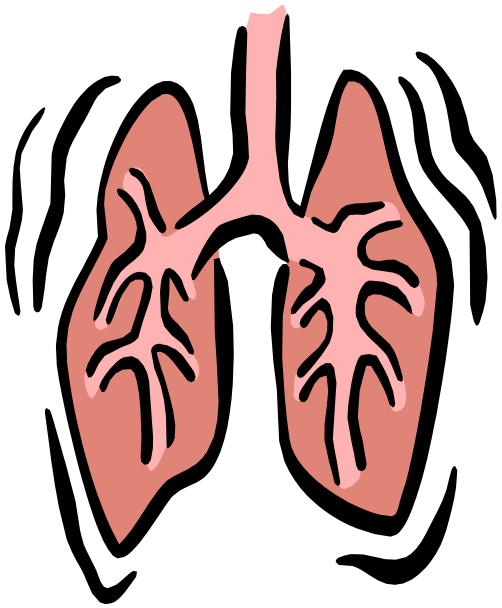
Carbon Monoxide

- colorless, odorless
- produced when carbon does not burn in fossil fuels
- present in car exhaust
- headaches, fatigue, and impaired vision

Sulfur Dioxide

- produced when coal and fuel oil are burned
- present in power plant exhaust
- causing wheezing and shortness of breath, especially in those with asthma

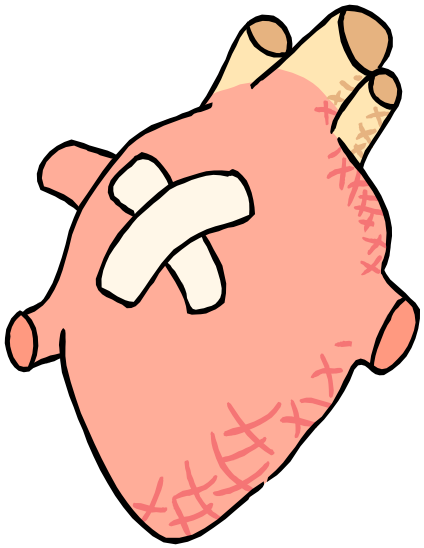
Nitrogen Dioxide



- reddish, brown gas
- produced when nitric oxide combines with oxygen in the atmosphere
- present in car exhaust and power plants
- affects lungs and causes wheezing; increases chance of respiratory infection

Particulate Matter

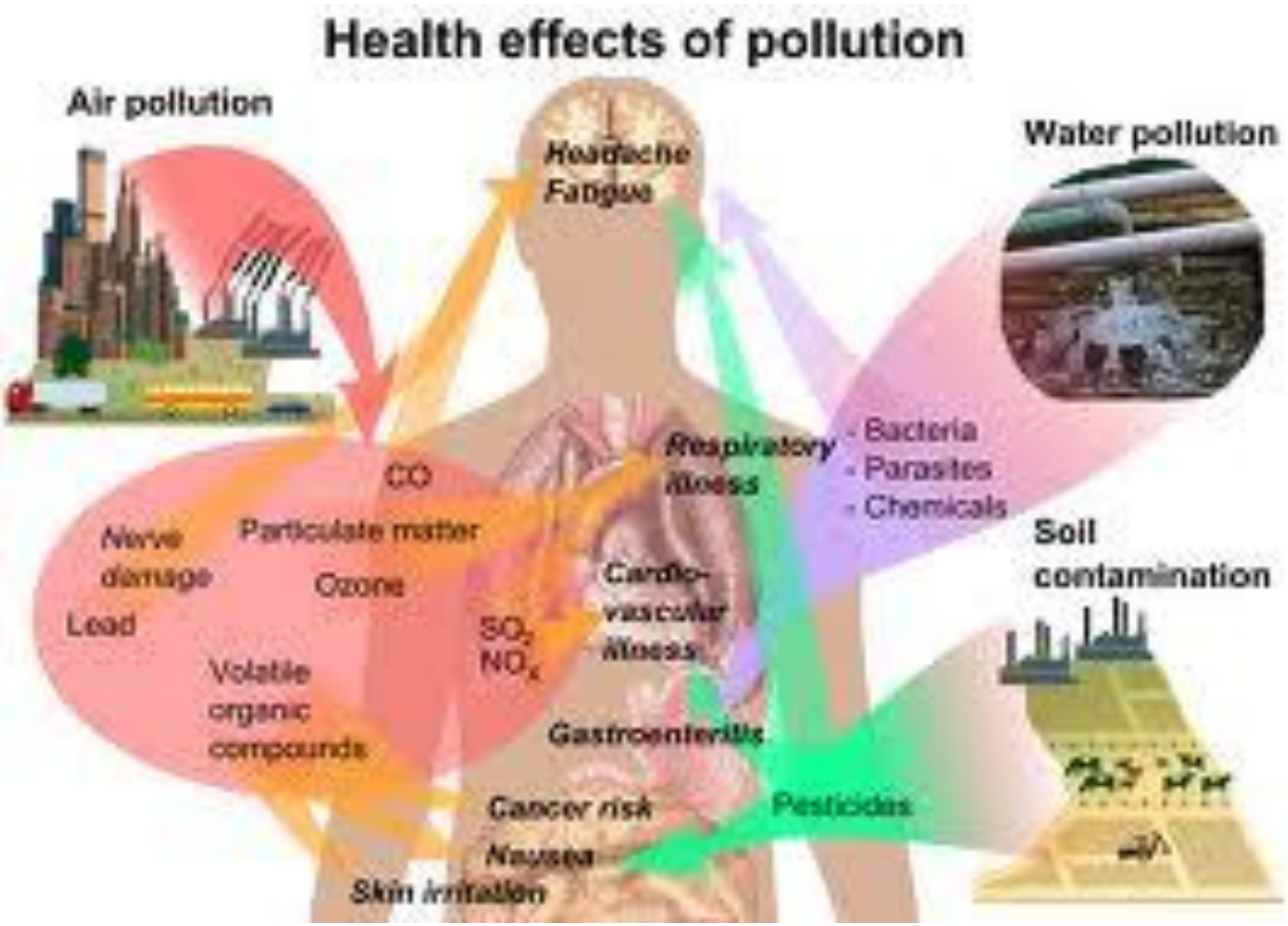
- particles of different sizes and structures that are released into the atmosphere
- present in many sources including fossil fuels, dust, smoke, fog, etc.
- can build up in respiratory system
- aggravates heart and lung disease; increases risk of respiratory infection



Ground Level Ozone

- at upper level, ozone shields Earth from sun's harmful UV rays
- at ground level, ozone is harmful pollutants
- formed from car, power and chemical plant exhaust
- irritate respiratory system and asthma; reduces lung function by inflaming and damaging lining of lungs

EFFECTS OF AIR POLLUTION


Health effects of pollution
Air pollution
Water pollution
Soil contamination
Headache
Fatigue
CO
Particulate matter
Ozone
Nerve damage
Lead
Volatile organic compounds
SO_2
NO_x
Respiratory illness
Cardio-vascular illness
Gastroenteritis
Cancer risk
Nausea
Skin irritation
- Bacteria
- Parasites
- Chemicals
Pesticides

- Ride your bike

- Tell your friends and family about pollution

- Make sure your parents get pollution checks on their cars

- Ride the school bus

- Learn more; stay up to date

- Join a group to stop pollution

- Encourage your parents to carpool to work

- Switch off lights, fan, heat, etc. when you leave the room

Water Pollution

Water Pollution occurs when energy and other materials are released into the water, contaminating the quality of it for other users.

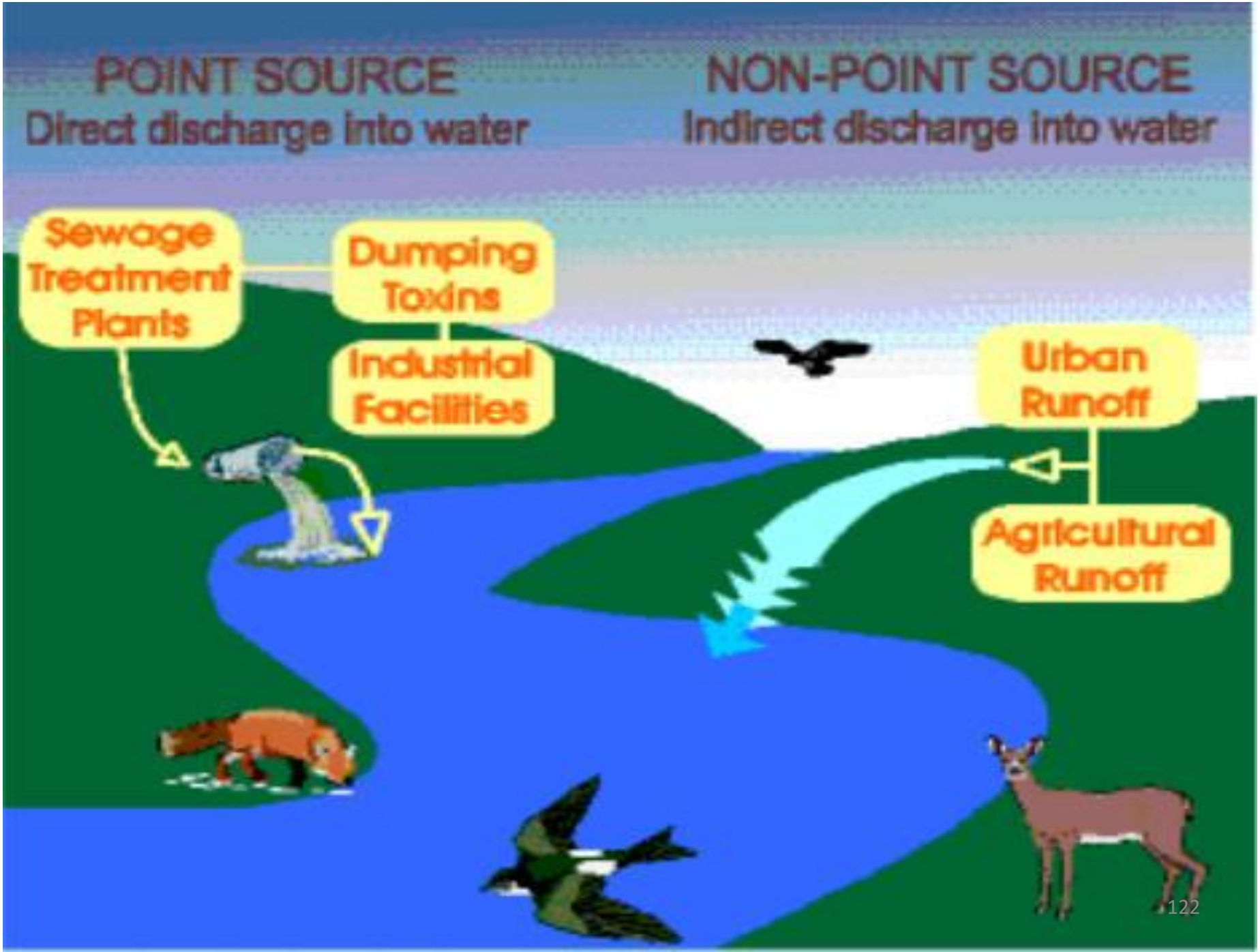
Types

Surface water pollution

> found on the exterior of the Earth's crust, oceans, rivers and lakes

Groundwater Pollution

>found in soil or under rock structure or aquifers


POINT SOURCE
Direct discharge into water
NON-POINT SOURCE
Indirect discharge into water
Sewage Treatment Plants
Dumping Toxins
Industrial Facilities
Urban Runoff
Agricultural Runoff

Different Causes of Water Pollution

- Marine Dumping
- Industrial Waste
- Sewage, mainly from households

Different Causes of Water Pollution

- Nuclear waste
- Oil pollution
- Underground storage leaks

Effects on Environment

- Toxic water
- Thermal heating
- Our sources of water

Effects on Humans

- Diseases caused by:
  - Drinking contaminated water
  - Swimming in polluted water
  - Contact with chemically polluted water

Effects on Animals

- 200 turtles in Australia's surround waters die each year

Effects on Animals

- Birds and mammals become coated with oil

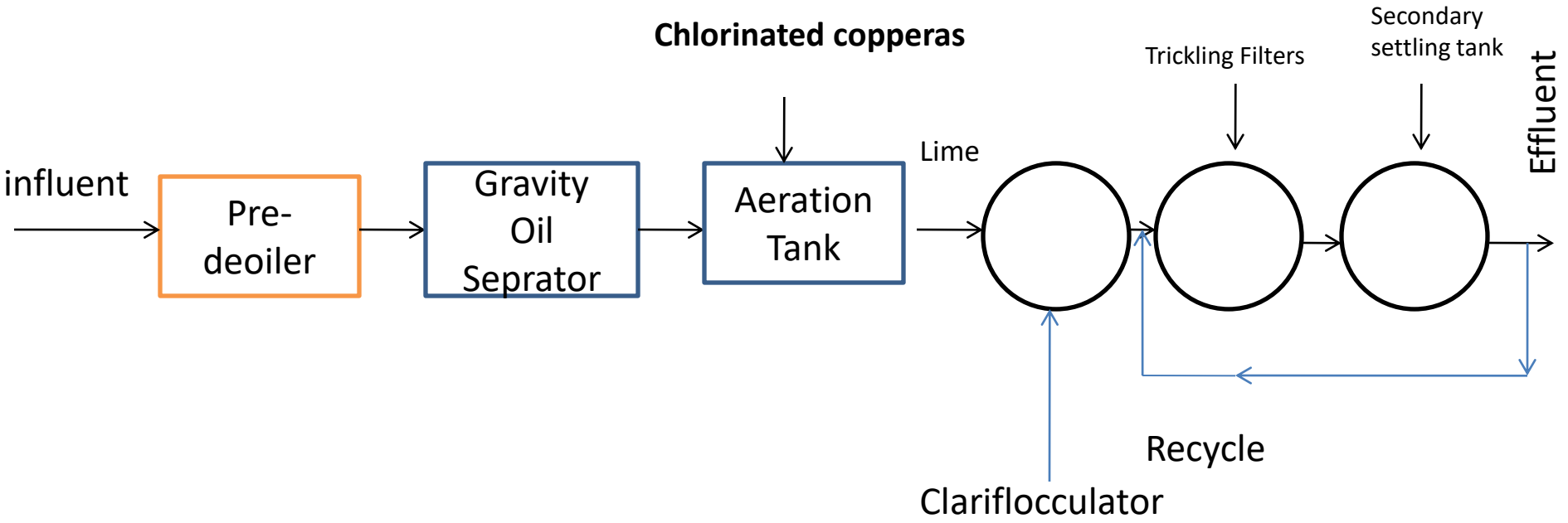
WASTE WATER TREATMENT METHODS

- ETP – (EFFLUENT TREATMENT PLANT) ETP is designed to treat industrial effluents

- STP - (SEWAGE TREATMENT PLANTS) STP is designed to treat the municipal waste water.

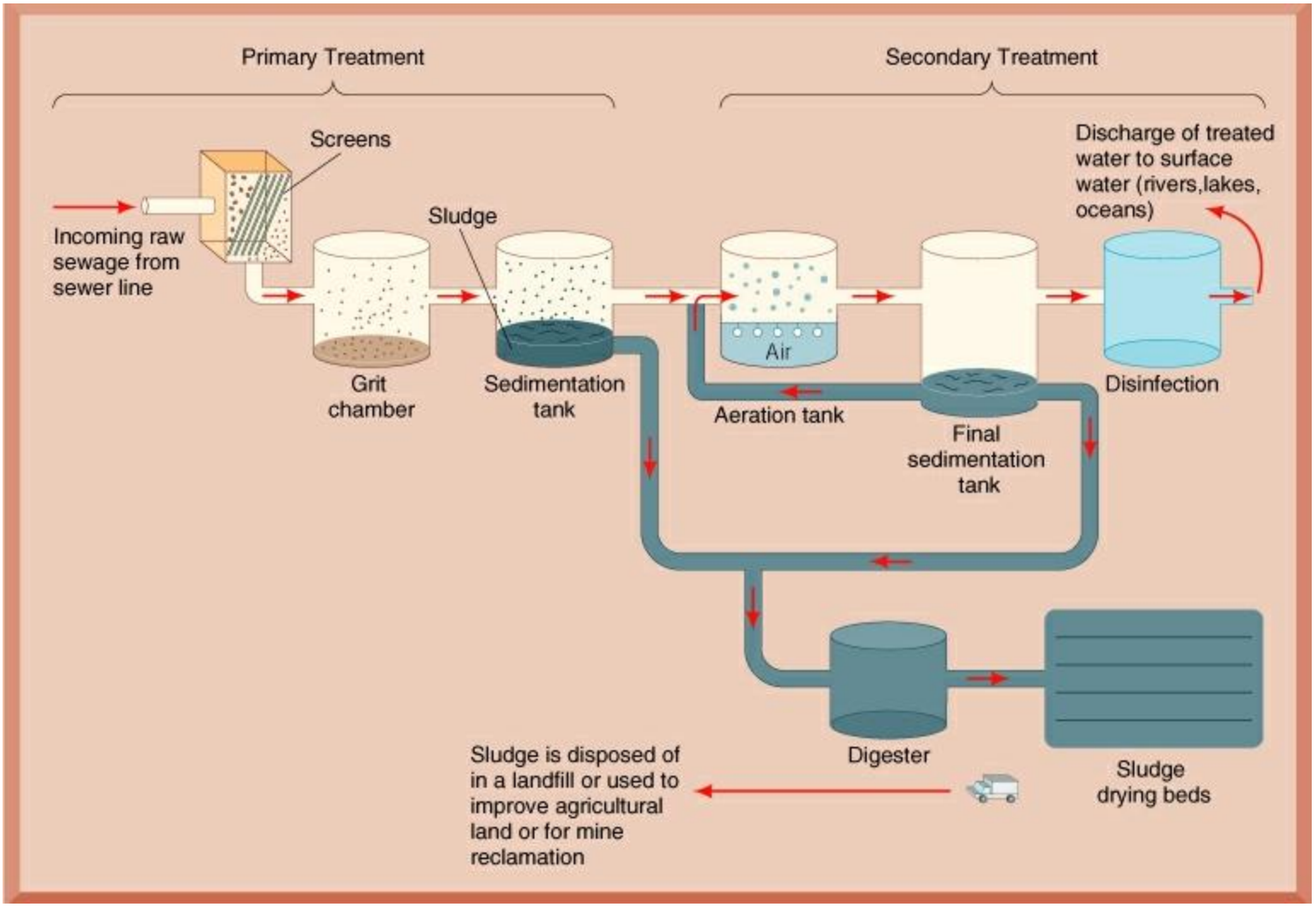
- CETP - (COMMON EFFLUENT TREATMENT PLANTS) is designed to treat all type of industrial effluents

Effluent Treatment Plant



Flow Chart for Treatment of Oil refinary Waste Water

Sewage Treatment plant



Noise Pollution: Causes, Effects & Solutions

- In modern life no one can escape from noise. Noise pollution is very dangerous. Many health problems can be caused by noise pollution such as annoyance, hypertension, hearing loss, tinnitus, high stress levels, sleep disturbance, aggression, etc. in the following article there are causes, effects and solutions to control the noise pollution.

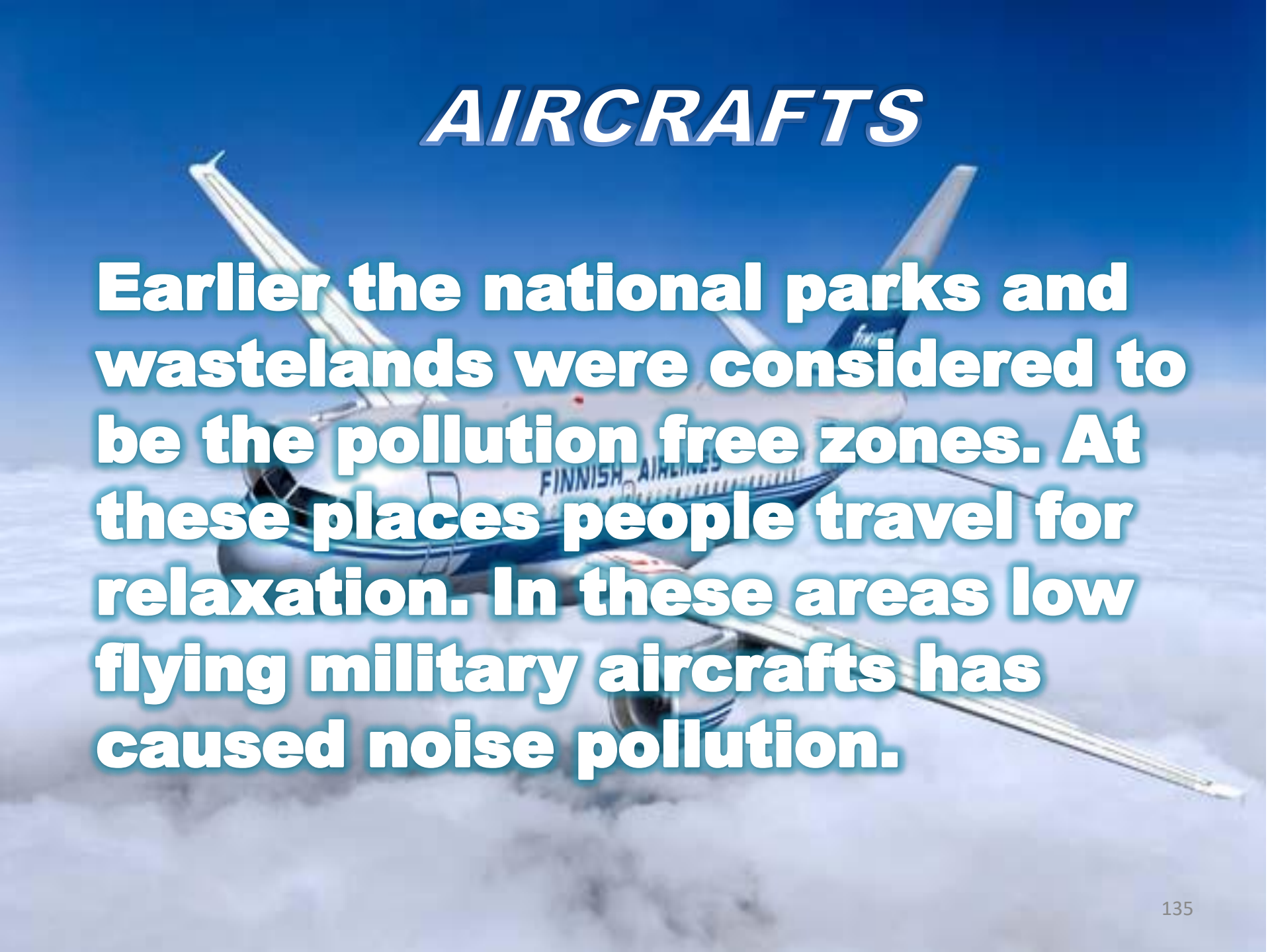
Noise Pollution: Causes, Effects & Solutions

- Displeasing sound that interrupts the balance of human or animal life is known as *"Noise pollution."* Noise word comes from Latin word nauseas means seasickness. Noise pollution is mainly from trains, aircrafts, loud music, transport vehicles and construction work. It has harmful effects on the physiological and psychological health of human beings. Noise pollution is measured in decibels. No human being can sleep when noise is at 45 decibels, at 120 decibels the ear is in pain and hearing begins to be damaged at 85 decibels.

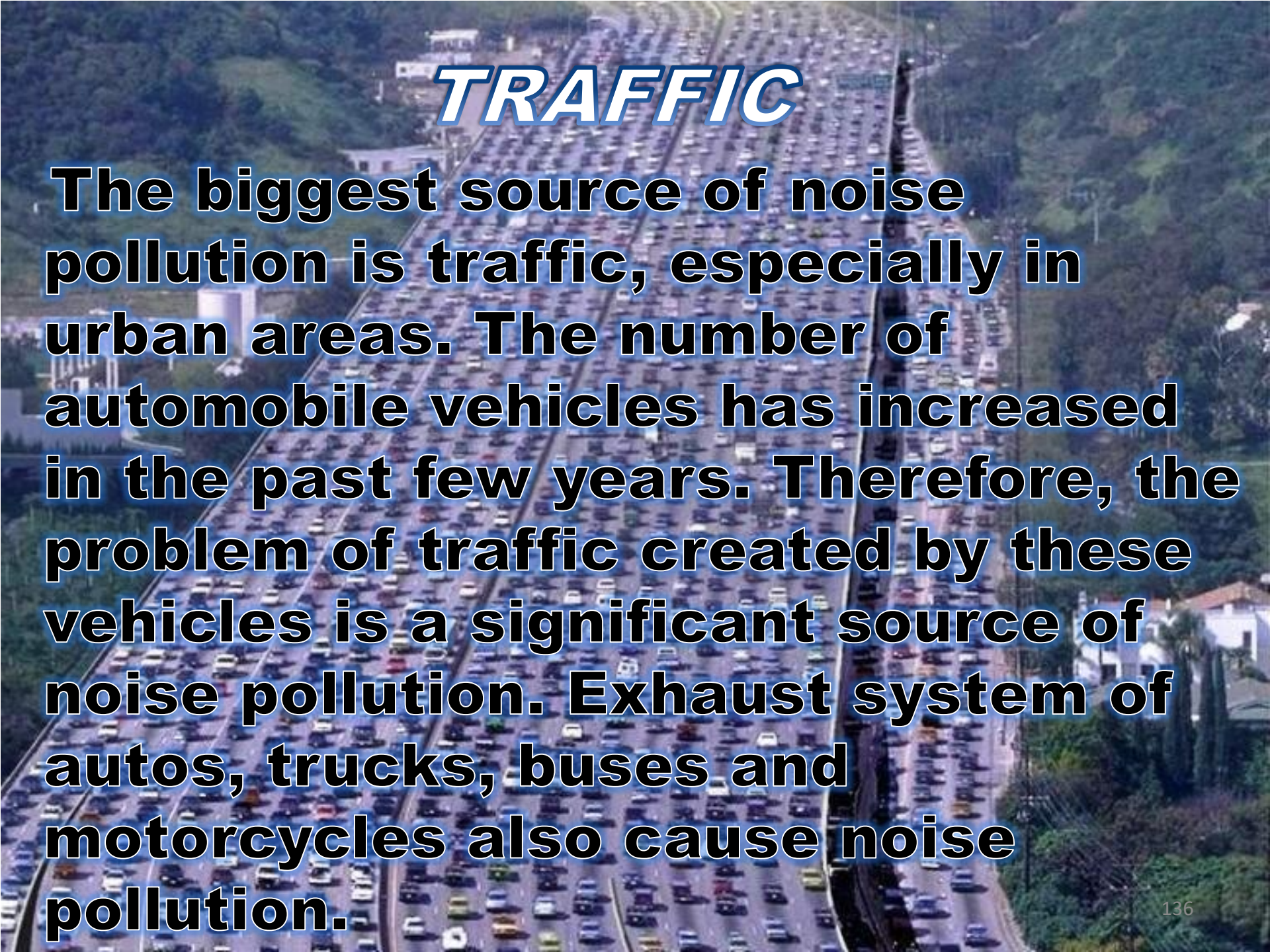
CONSTRUCTION EQUIPMENTS

In the construction of roads and buildings different types of machines and equipments are used which causes noise pollution. Machinery used for construction includes pavement breakers, bulldozers, pneumatic hammers, loaders, dump trucks, air compressors, etc. is also responsible for noise pollution to a great extent.

AIRCRAFTS



Earlier the national parks and wastelands were considered to be the pollution free zones. At these places people travel for relaxation. In these areas low flying military aircrafts has caused noise pollution.



TRAFFIC

The biggest source of noise pollution is traffic, especially in urban areas. The number of automobile vehicles has increased in the past few years. Therefore, the problem of traffic created by these vehicles is a significant source of noise pollution. Exhaust system of autos, trucks, buses and motorcycles also cause noise pollution.

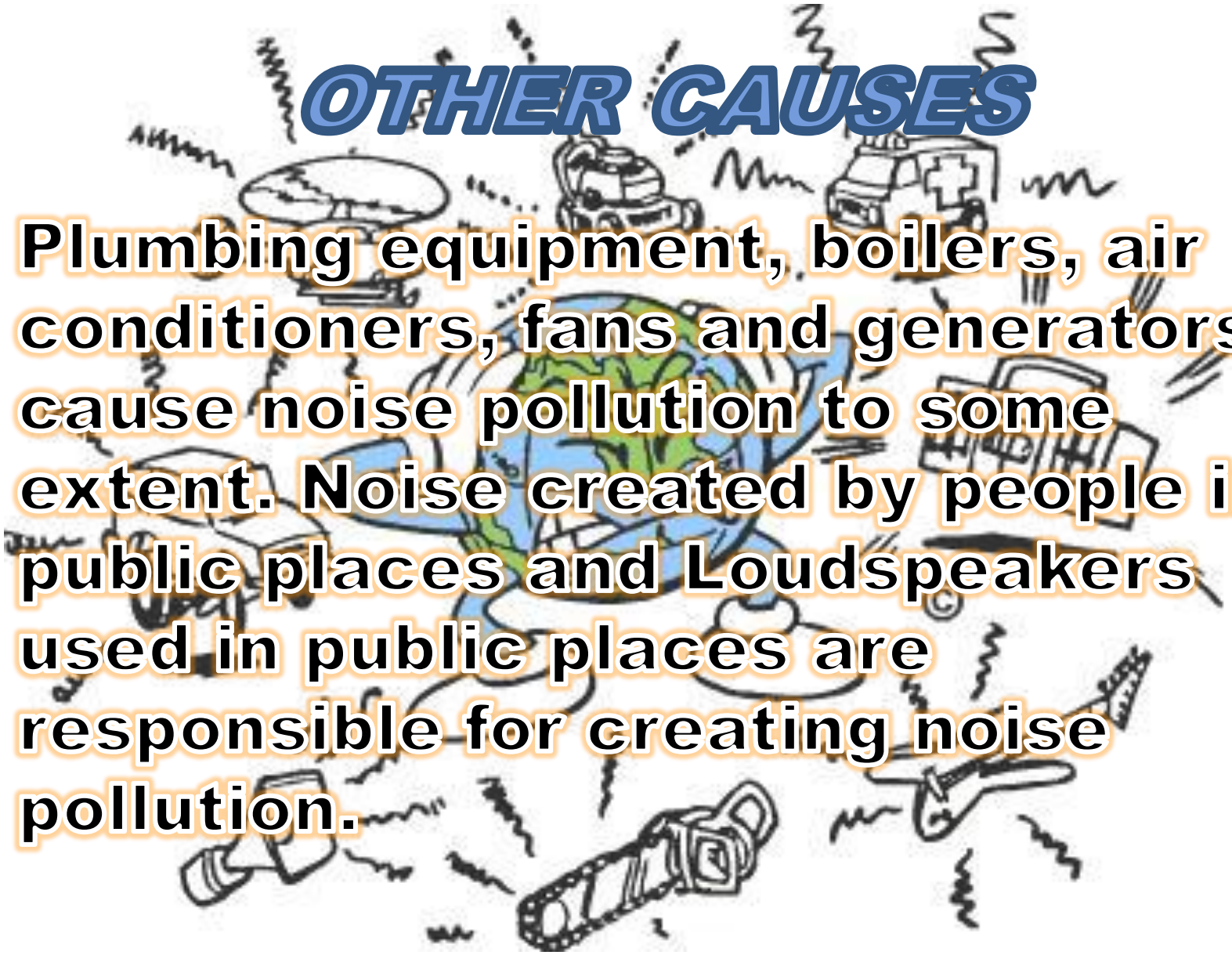
INDUSTRIAL NOISE

Different machines used in industries cause noise pollution. These machines include compressors, motors and other machinery. In the premises of industries it is recommended to grow trees, which act as absorbents of noise.

HOUSEHOLD EQUIPMENT

The household equipments such as mixers, vacuum cleaners and other noise creating equipments. These machines do not cause much noise pollution but it should not be neglected.


RAILWAY STATIONS
Locomotive engines, horns and whistles and switching and shunting operation in rail yards are the major sources of noise pollution.



OTHER CAUSES

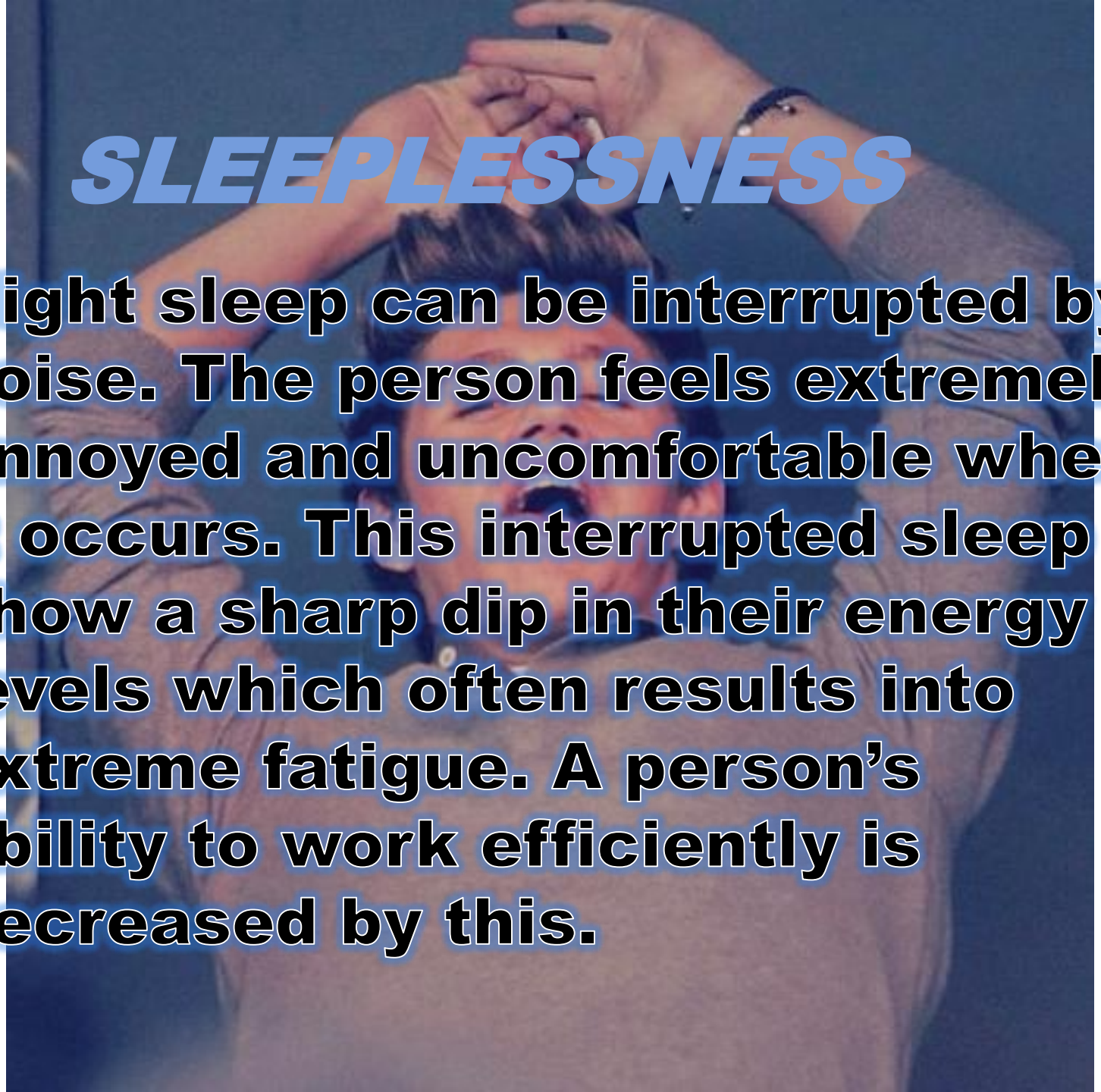
Plumbing equipment, boilers, air conditioners, fans and generators cause noise pollution to some extent. Noise created by people in public places and Loudspeakers used in public places are responsible for creating noise pollution.

HEART PROBLEMS:

Heart related problems can be caused by noise pollution. As noise levels constrict the arteries the high intensity sound causes a dramatic rise in the blood pressure, disrupting the blood flow. The heart rate also increases. Due to the increased blood pressure the heart problems such as ischemic heart disease are caused.

HEARING PROBLEMS:

Noise pollution can cause hearing problems such as tinnitus. It becomes noise for the ear when the sound level crosses the 70dB mark. Noise levels above 80 decibels produce damaging effects to the ear. It can cause irreparable damage and lead to permanent hearing loss when noise level is above 100 decibels for a considerable period of time.

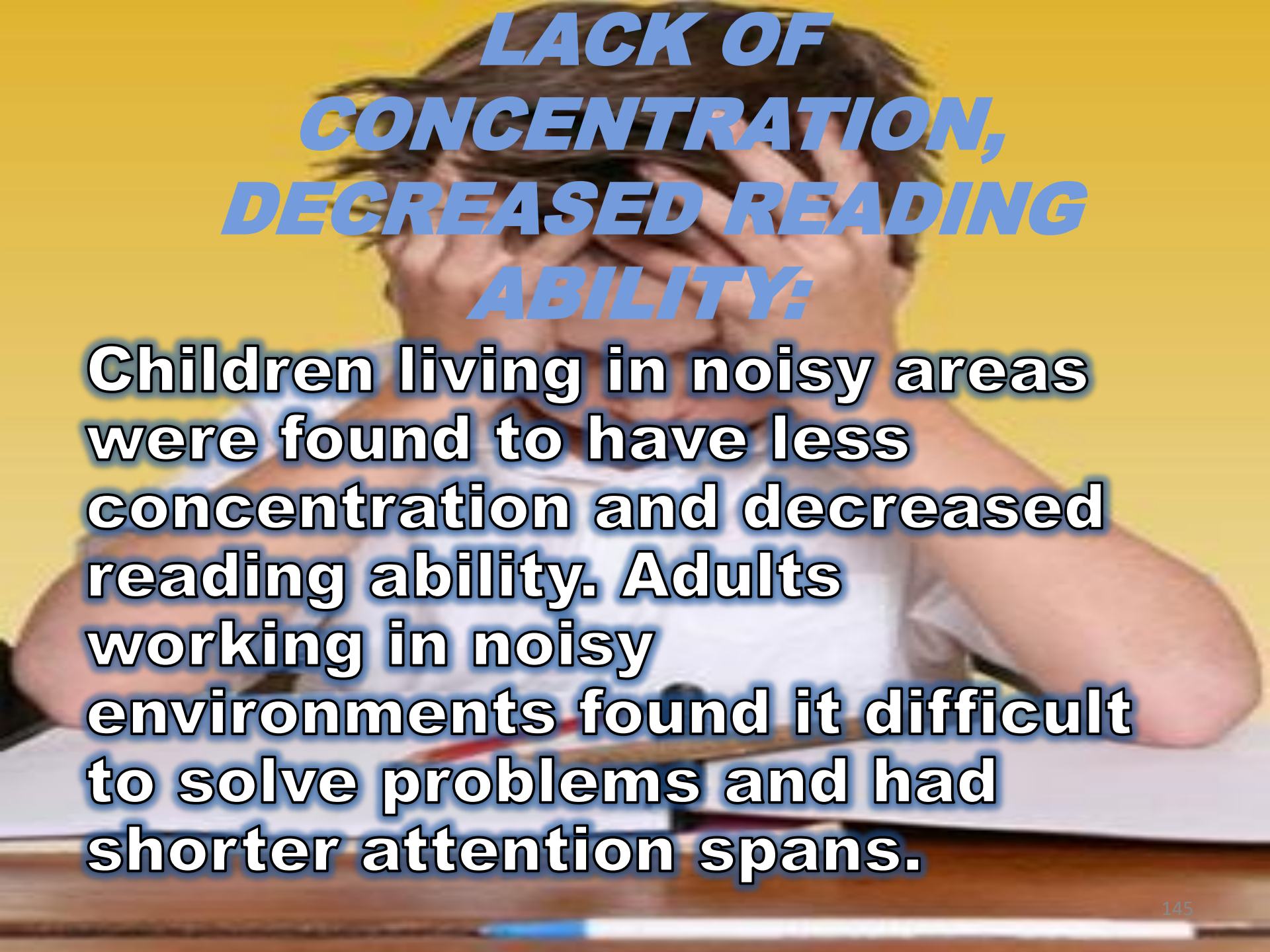


SLEEPLESSNESS

Night sleep can be interrupted by noise. The person feels extremely annoyed and uncomfortable when it occurs. This interrupted sleep show a sharp dip in their energy levels which often results into extreme fatigue. A person's ability to work efficiently is decreased by this.

MENTAL HEALTH PROBLEMS

Noise pollution can cause high stress level as well as arouse the violent behavior. Constant noise can also trigger headaches, make people tense and anxious, and disturb emotional balance.



LACK OF CONCENTRATION, DECREASED READING ABILITY:

Children living in noisy areas were found to have less concentration and decreased reading ability. Adults working in noisy environments found it difficult to solve problems and had shorter attention spans.

RELEASE OF STRESS HORMONES:

- Stress hormones such as adrenaline and cortisol are discharged by noise pollution. Stress level is increased by these hormones and stifles the immune system.

INTERFERENCE IN VERBAL COMMUNICATION:

- Proper Communication between two people is not allowed by a noisy environment that produces more than 50-60 decibels. It may lead to misunderstandings as interpreting the speech of a second person becomes difficult.

HIGH BLOOD PRESSURE:

- Constant noise can cause high blood pressure. This is mainly because of the affect of stress hormones on the body.

SOLUTIONS TO CONTROL NOISE POLLUTION

TREE PLANTATION:

Effective solution for noise pollution is to plant bushes and trees around the sound generating sources. Sound passage is blocked by the dense shrubs and trees. Trees can be planted in the surrounding area to live peacefully.

SOUNDPROOF HOMES:

- To block unwanted noise from outside soundproof doors and windows can be installed. If you stay in crowded city area these soundproof options are important for complete relaxation.

LOUDSPEAKER PROHIBITION:

- The major cause of noise pollution in public areas is loudspeaker. For the welfare of the people it should be banned at any cost. Those who violate and play loudspeakers in crowded areas and public places strict laws should be imposed against them.

FACTORY LOCATION:

- From the residential areas factories and industries should be located in far off places. Installation of sound detectors will help in analyzing the sound frequencies on a regular basis.

WHITE NOISE MACHINE:

- For overcoming the effects of noise pollution the latest technology is using white noise machine. This device converts the unbearable noise into pleasant sound. A white noise machine is placed between the source of noise and the receptor. It produces soft sound like that of a waterfall, fan and soft music.

MACHINE QUALITY:

- The quality of machines should be optimized to reduce sound production. Lubrication of the machinery and servicing should be done to minimize noise generation.

OTHER SOLUTIONS

- Noise pollution at home is caused by using music systems and television sets with high volumes. Instead of using these appliances with the high volume, it is better to keep it at a moderate level.
- To wear ear protection while working in noisy conditions is an effective way to manage noise. Vehicles and factory machines need to be maintained properly and checked from time to time. Lack of maintenance will not only increase noise levels, but also decrease the efficiency of these machines.
- Sound insulation at the top of the roof can reduce the aircraft noise.
- Add a layer of plasterboard or wood to the dividing wall to protect yourself from the noise from neighbors.

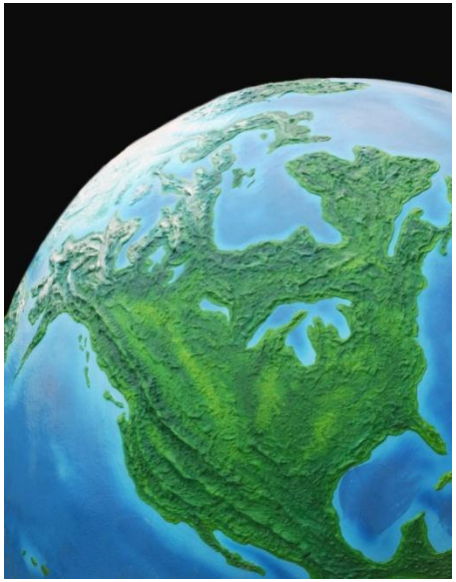
What is the Greenhouse Effect?

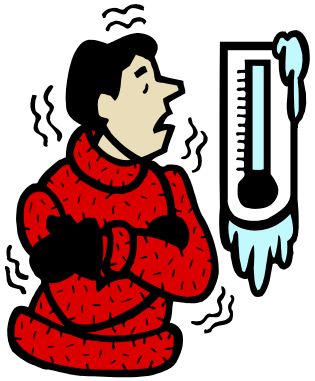
- Rise in Earth's temperature
- By certain atmospheric gases
- That trap the Sun's energy

Examples of Heat Trapping Gases

- Water vapor (H_2O)
- Carbon dioxide (CO_2)
- Nitrous oxide (N_2O)
- Methane (CH_4)

Why are the Gases Important?





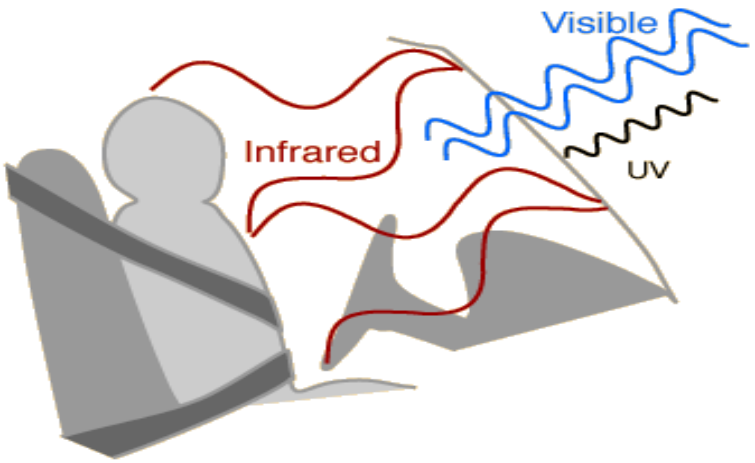
- Heat would escape back into space
- Earth's temperature would be 60ºF colder
- Makes Earth suitable for life

Greenhouse Effect Examples: Greenhouse

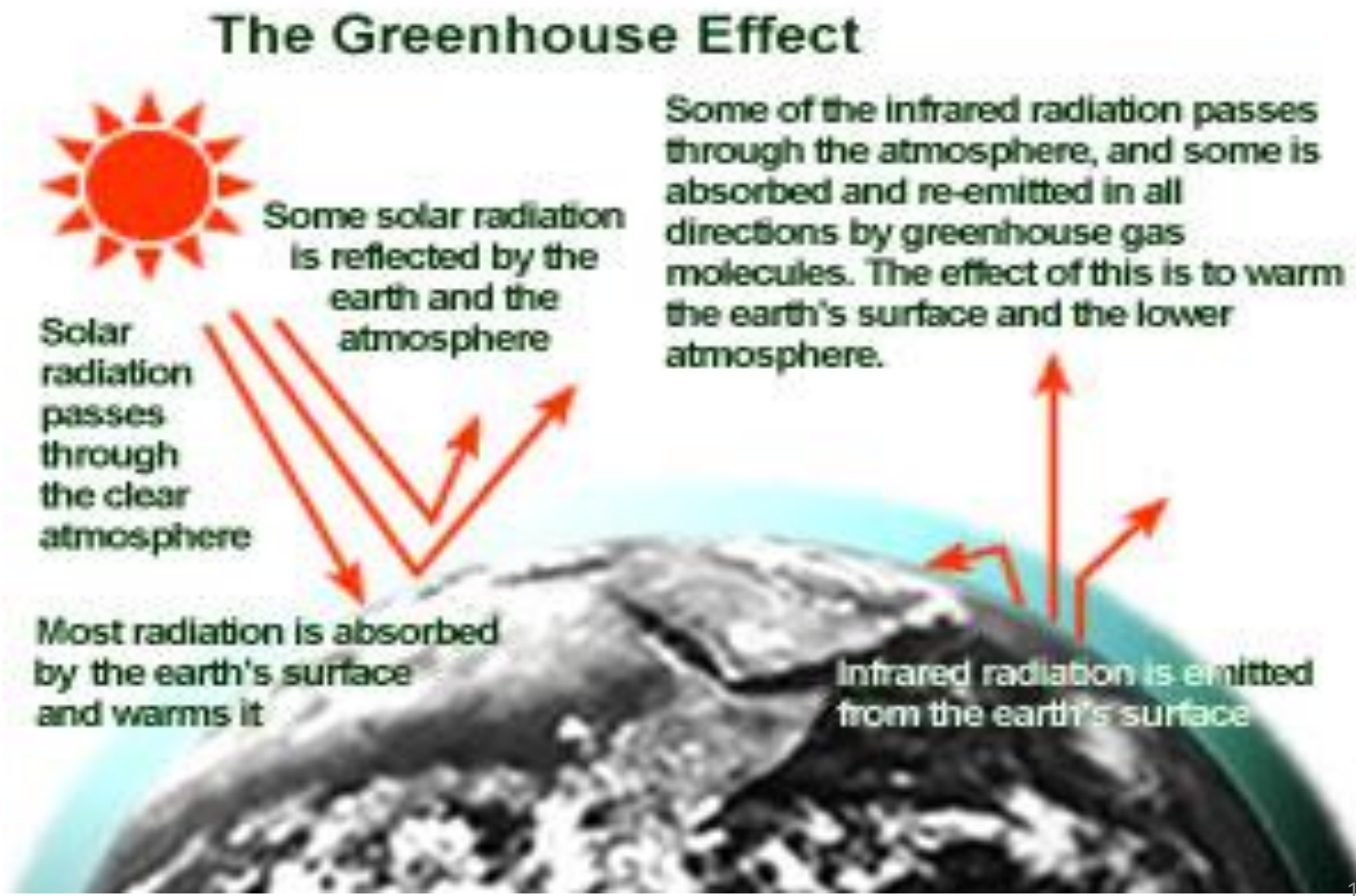
- Trap heat from sun
- Glass lets in light
- Glass keeps heat from escaping
- Causes greenhouse to heat up

Greenhouse Effect Examples:
Car Parked in Sunlight

- Glass lets in light
- Glass keeps heat from escaping
- Causes the car to heat up

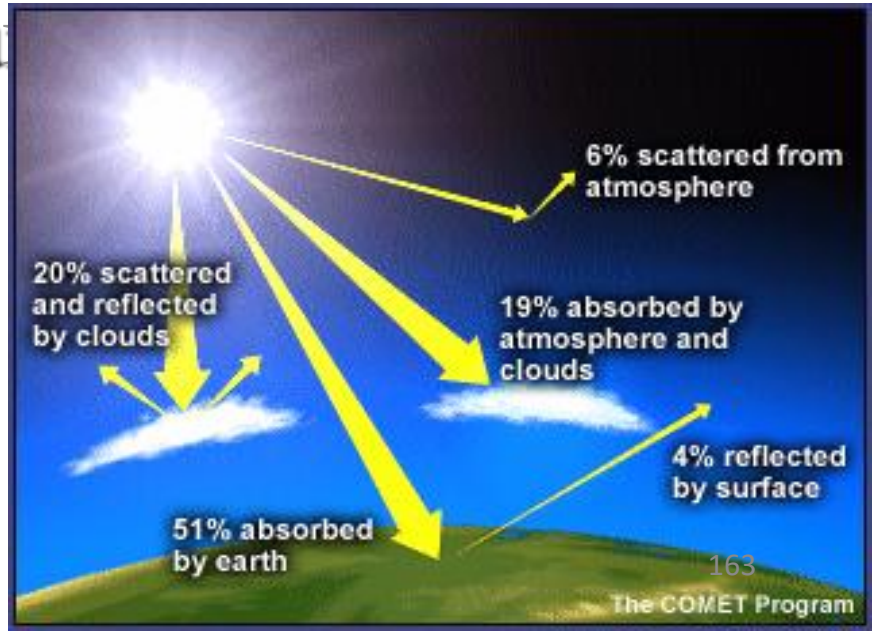


Process of the Greenhouse Effect



Process of the Greenhouse Effect

- Sun's energy passes through atmosphere
- 26% is reflected or scattered
- 19% absorbed by clouds, gases, and particles
- 4% reflected to space by su
- 51% reaches the surface



Possible Causes of the Greenhouse Effect

- Deforestation and agriculture
- Burning of fossil fuels, gasoline, oil
- Burning of wood and coal
- CFC's
- Population Growth

Causes of Climate Change

- Greenhouse gases increase through human activity
- Deforestation
- Use of fertilizers
- Burning of organic matter
- Burning of fossil fuels

Consequences of Climate Change

- Climate changes
- Changes in wildlife adaptations and cycles
- Melting of polar ice caps
- Increase in sea level
- Flooding in coastal areas

International Conventions / Protocols

- Discussion to evolve strategies to environmental issues .

- All Heads of nations or the Representatives meet at a common platform to sign agreement

Such meetings are called international agreements, protocols, conventions
A Protocol is generally a treaty or agreement

Earth Summit, 1992

UNCED – United nation's conference on environment and development
Took place on june 3-14,1992 in Riode Janerio, brazil

The Earth Summit Focused on:

- Development and protection of Environment.
- Global action plan for Sustainable Development
- Substantial increase in new funding from developed countries to aid in the Sustainable Development

Earth Summit Johannesburg 2002

From August 26 to sept 4, 2002 in Johannesburg (South Africa)

The Conference highlighted on :

- Water Sanitation
- Energy
- Health
- Agriculture
- Biodiversity an d Ecosystem Management

Kyoto Protocol Dec 11,1997

UNFCCC – united nations frame work convention on climate change

This Protocol subject to legal binding to cut green house emissions by mininimum 5%

The important component of Kyoto Protocol are as follows:

Clean Development Mechanism (CDM) - To keep overall global emissions with the limits.

Emission Trading- If a developing countries reduces green house gas emission in excess of the required amount.

Joint Implementation - It establishments in 2 countries cannot meet the emission targets as set by the Kyoto protocol. Then this establishments can shut down their business and can jointly start new enterprise by introducing Capable of reducing GHG emissions

Montreal Protocol 1987

Is the International Agreement on the ozone depletion Substances

UNIT-V
ENVIRONMENTAL POLICY ,LEGISLATION AND EIA

Environment Impact Assessment

What is EIA?

Environmental Impact Assessment (EIA) is a process which ensures that all environmental matters are taken into account quite early in the project at planning process itself.

It takes into consideration not only technical and economic considerations but also, traditional aspects like impact on local people, biodiversity etc.

Environment Impact Assesment

Why EIA?

EIA is intended to prevent or minimize potentially adverse environmental impacts and enhance the overall quality of a project. The main benefits and advantages of EIA are:

✓Lower project costs in the long-term

✓Increased project acceptance

✓Improved project design

Environment Impact Assessment

- ✓Informed decision making
- ✓Environmentally sensitive decisions
- ✓Increased accountability and transparency
- ✓Reduced environmental damage
- ✓Improved integration of projects into their environmental and social settings

Environment Impact Assessment

Which type of projects under go EIA?

- ✓Agriculture
- ✓Construction (Road networks, Malls, Townships, Dam etc)
- ✓Industries
- ✓Electrical projects
- ✓Waste disposal
- ✓Any developmental projects around Protected Areas / Nature Preserves
- ✓Clean Development Mechanism CDM projects

Environment Impact Assesment

The EIA Directive

The EIA Directive requires projects likely to have significant effects on the Environment by virtue of their nature, size or location to undergo an environmental assessment before the competent authority in question grants consent.

The EIA Directive defines a **project** as the execution of construction works or of other installations or schemes, other interventions in the natural surroundings and landscape including those involving the extraction of mineral resources

Environment Impact Assessment

The EIA Directive

The EIA should **identify**, **describe** and **assess** the **direct** and **indirect** effects of a project on the following factors:

- ✓Human beings
- ✓Fauna and flora
- ✓Soil, Water & Air
- ✓Climate and the landscape
- ✓Material Assets
- ✓Cultural Heritage
- ✓Interaction between all above factors

*EIA therefore should have a very strong **social dimension***

Environment Impact Assessment

History of EIA in India

Started in 1976-77, when Planning Commission asked Department of Science & Technology to examine River Valley Projects from environmental angle

Till 1994, Environmental Clearance from Central Government was an administrative decision which lacked legislative support.

On 27th January 1994, Union Ministry of Environment & Forests, GOI under Environment (Protection) Act 1986, **promulgated EIA notification making Environment clearance mandatory for expansion or modernization of any activity or for setting up new projects listed in Schedule one of the notification**, which have been amended more than 12 times.

Environment Impact Assessment

EIA Clearance required

Total EIA clearance is required for 32 categories of developmental works broadly categorized into following industrial sectors:

- ✓Mining
- ✓Thermal power plant
- ✓River valley
- ✓Infrastructure (Road, highway, ports, harbour, airports,
- ✓Industries including very small electroplating or foundry units)

Certain activities permissible under Coastal Regulation Zone Act 1991, also require similar clearance

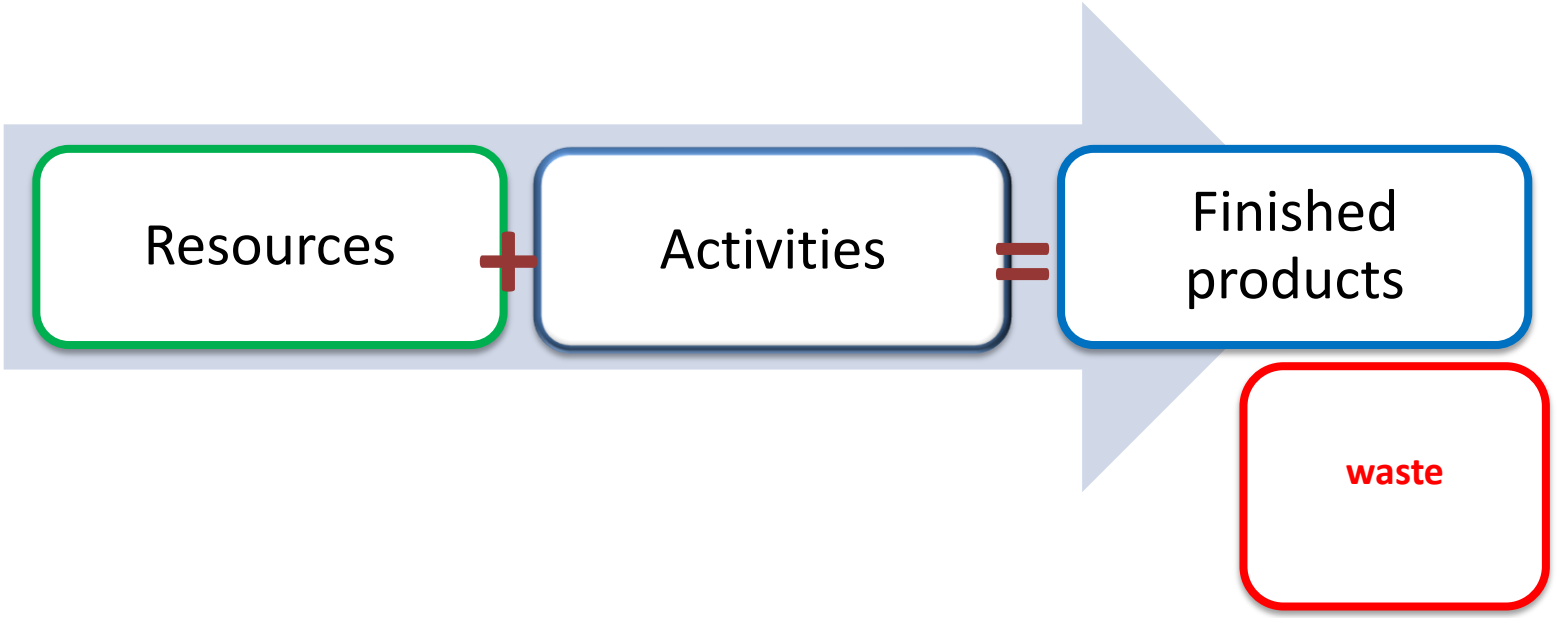
Towards Sustainable Future

Resources

Any thing that we take from the **physical landscape to** make other things that we **need** or **want** for our lives, eg

- Drink
- Food
- Shelter
- Fuel/Power
- Manufactured goods

But, using resources can lead to a lot of **waste**

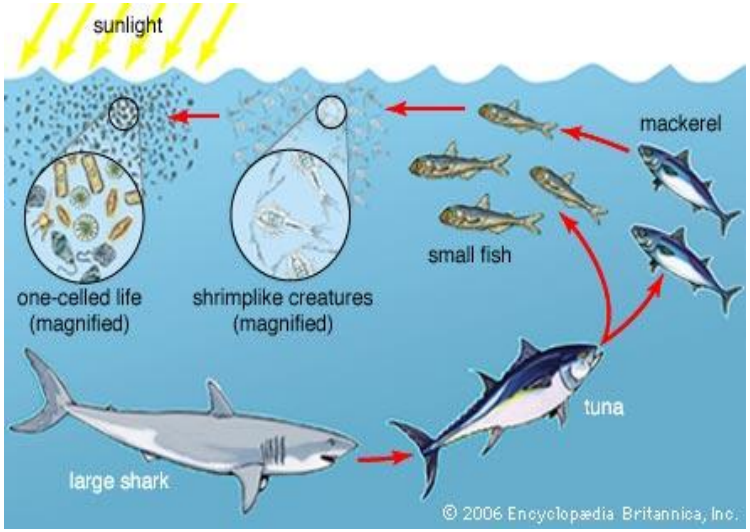


Resources: coal, oil, gas and minerals

Coal, oil and gas are **Fossil Fuels.**
We dig up coal and drill for oil.
We then burn the coal and oil (and gas) to generate electricity

Resources: seas and oceans

70 % of the Earth's surface is water



To think about:

What do you think will be the **impact** of these types of fishing on the resources of the sea?

Resources: forests

Resources: minerals

Iron ore mine, Australia

Granite quarry, Glensanda, Argyll

Sustainable development

- **Development** means making life **better, eg,** to have a better standard of living and an improved quality of life
- **Sustainable Development** means making sure that the things we do, the goods we buy and the lifestyle we have today will not harm the environment for us, for people in other places and for future generations

Sustainable development means

- Looking at levels of consumption and waste

- Thinking about our careful use of the Earth's resources

- Realising that we are each responsible for our actions, and that what we do can have a huge effect on other people, and places

Threats to sustainability

- Population explosion

➢Consumerism

Over-Exploitation of Resources

overexploitation of resources responsible for changes in rainfall patterns

Strategies for Sustainable Development

- Using appropriate Technology

cottage industry appropriate technology

photo voltaic generating electricity from sunlight

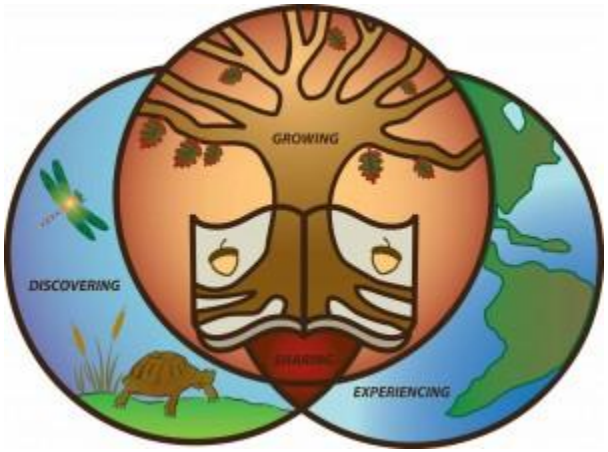
- Reduce, Reuse , Recycle Approach

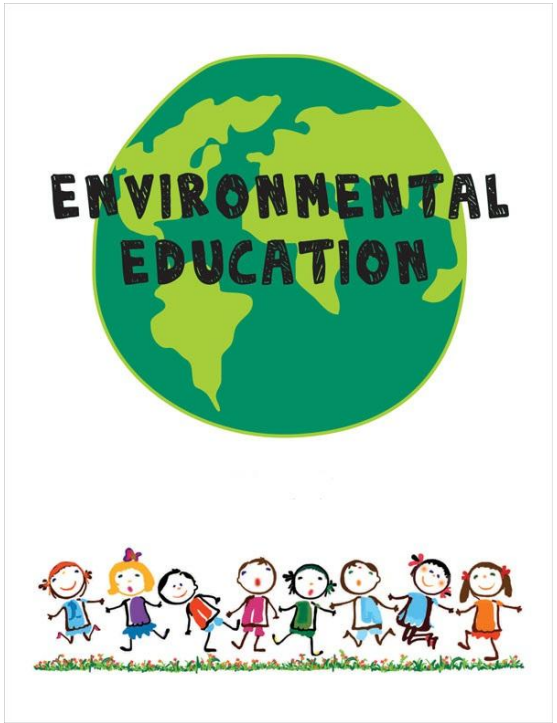
➢Promoting Environmental Education and Awareness

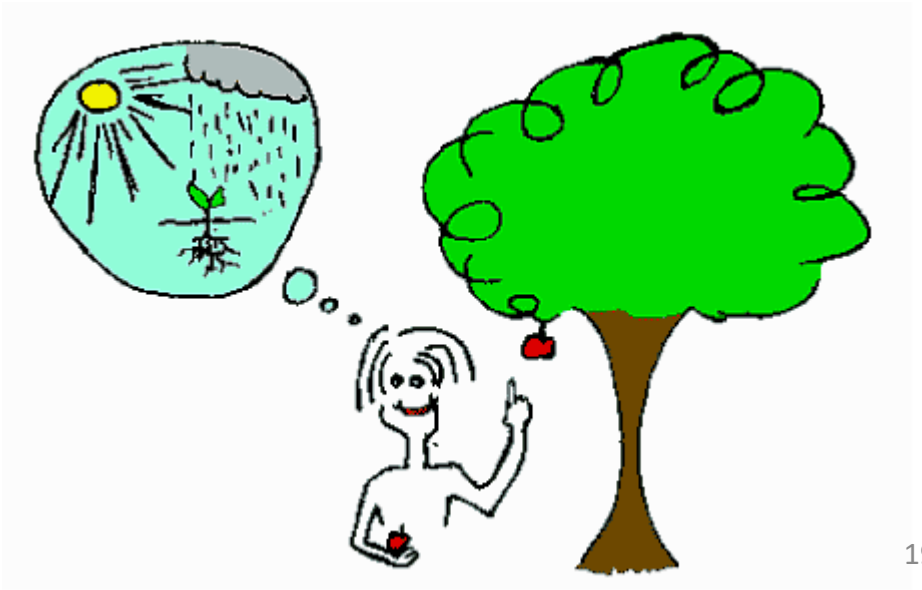
- Resource utilization as per carrying Capacity

- Improving Quality of life including Social, Cultural and Economic Dimensions

ENVIRONMENTAL EDUCATION







CONSERVATION OF RESOURCES

- Water Conservation
- Soil Conservation
- Conservation of Biodiversity

URBAN SPRAWL

So, big question:
How many people can the Earth sustain, and at what standard of living?

1950 2 Billion

2013 7 Billion

Contrasting lifestyles, Manilla

...9,000 garments thrown into landfill every five minutes

Is this sustainable?

Sustainable living-recycling clothes and other textiles

Where do recycled clothes go?

60% of old clothes go abroad

35% used for mattress stuffing

Sustainability? what's the message here?

Think Global Act Local !

Bag 4 Life
The Eco Friendly Bag Company
www.bag4life.co.uk

What do you do with your plastic bags?

Is this sustainable?

If you recycle a tonne of paper, how many trees are you saving?

A. 12 trees.

B. 17 trees.

C. 23 trees.

D. 28 trees.

Recycling just one aluminium can saves enough energy to run a television for how long?

A. 3 hours.
B. 6 hours.
C. 9 hours.
D. 12 hours.

How many years does it take a single aluminium can to decompose?

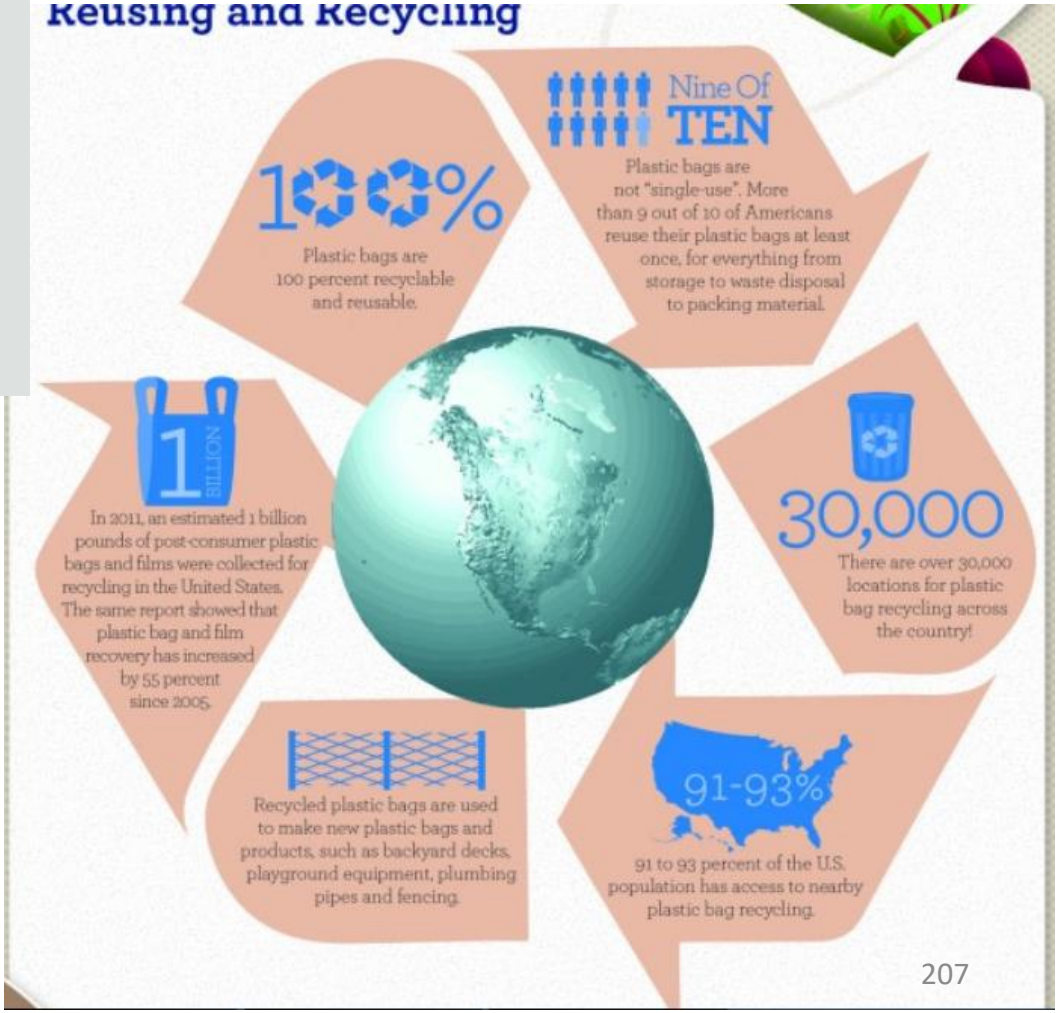
A. 20 – 40 years.

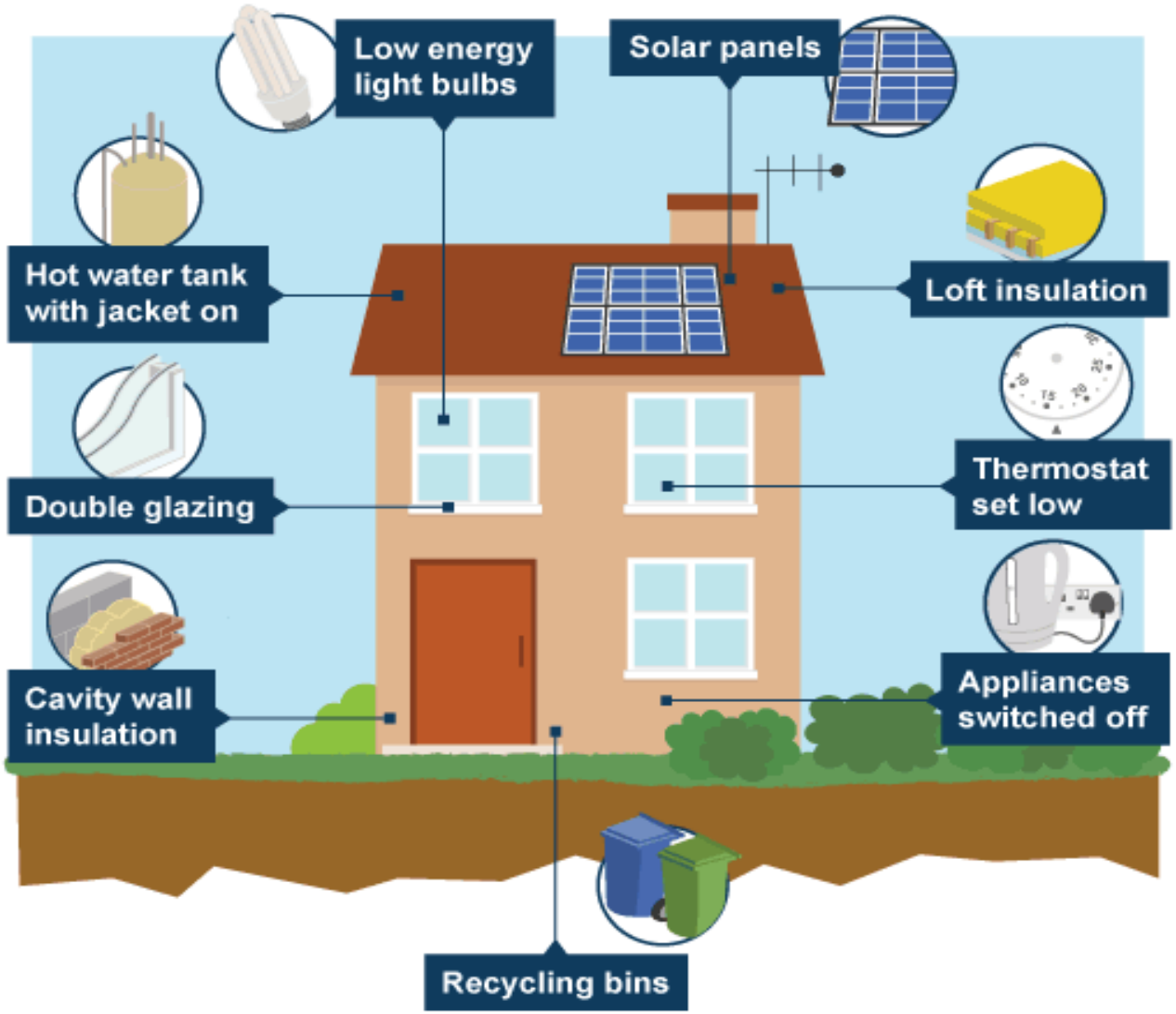
B. 60 – 80 years.

C. 80 – 100 years.

D. 100 – 120 years.

Sustainability: plastic bags; a problem or not?




Low energy light bulbs
Solar panels
Hot water tank with jacket on
Loft insulation
Double glazing
Thermostat set low
Cavity wall insulation
Appliances switched off
Recycling bins

Landfill is becoming a growing problem....

ENVIRONMENT AND HUMAN HEALTH

- Infectious Organisms
- Chemicals
- Noise
- Radiations
- Diet
- Settlement

CONCEPT OF GREEN BUILDING

A) Green Building Materials

- The materials to be used in the green building should be ecofriendly.
- These should be obtained from renewable resources
- These should be Recyclable

B)Energy Consideration in Green Building

- Compact Florescent Lamps (CFLs) can reduce electricity requirements
- Natural day light reduces electricity requirement during day time

C) Water Requirement in Green Building

- Water is used efficiently by employing water efficient applicences.

D) Health Consideration in Green buildings

- Green building provides sufficient air circulation.
- The Non-Toxic Materials and breathable walls help and maintain indoor air quality