

Social Issues and The Environment

Water Conservation

- Overuse/misuse of water in various sectors – household, agriculture, and industry.
- Water pollution
- Shortage of potable water
- Increase in surface run-off and sub-soil water table drop due to deforestation.
- Extensive/widefloods caused by rapid surface flow of water.
- Saving water in agriculture - Drip irrigation system; recharging sub-soil aquifers by rainwater harvesting.
- Saving water in urban settings – nearly 50% water is lost during transportation of water.

- **Strategies/policies adopted for conservation of Water/Sustainable Water Management:**

- Preventing wastage of water

- Reuse of water

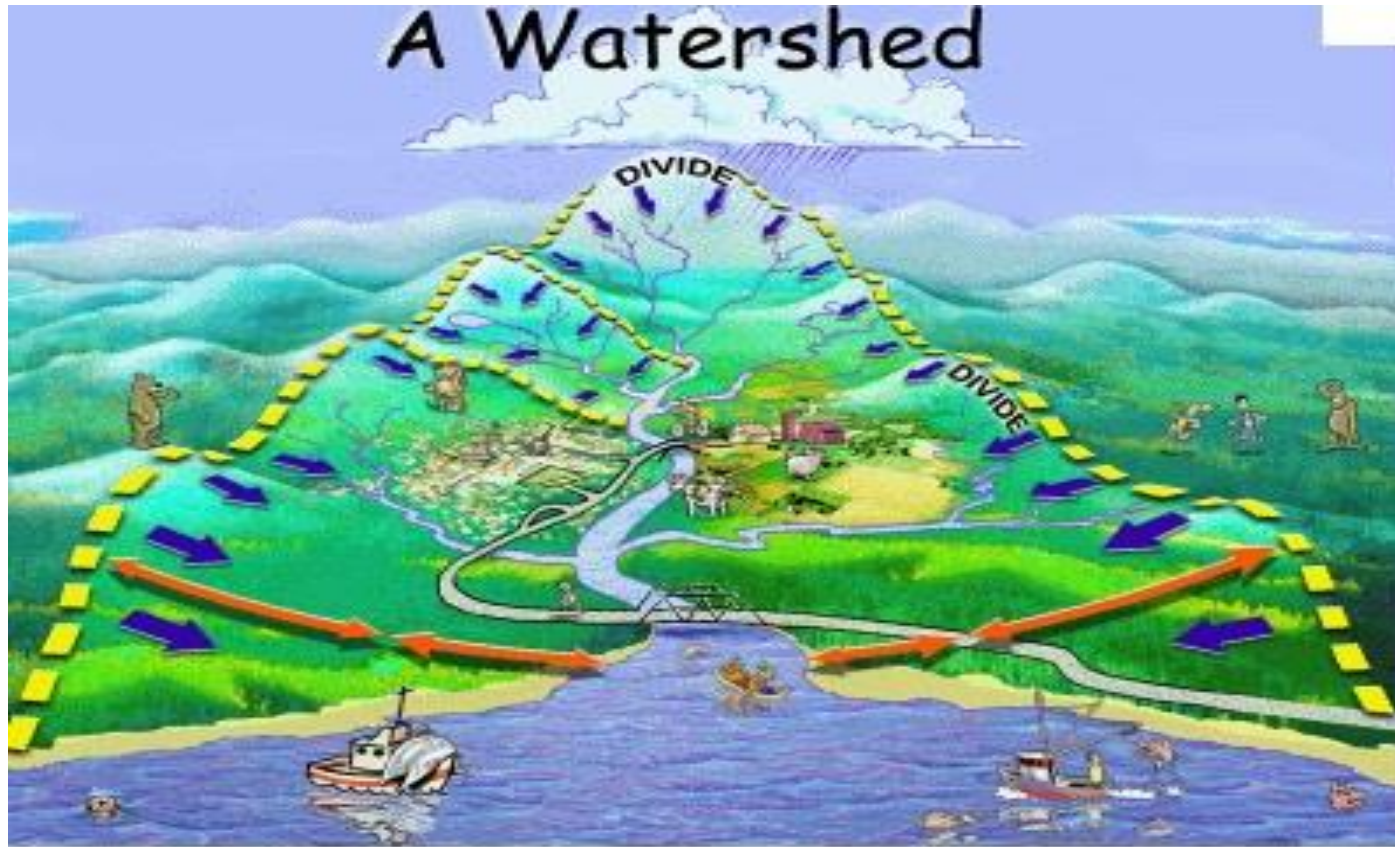
- Decreasing run-off/overflow losses

- Reducing Evaporation losses

- **Storing water in soil.....Watershed Management**

- Reduce Irrigation losses

Watershed Management



- **Watershed** - Land area from which water drains under gravity to a common drainage channel.

WSM

- 1. WHAT IS WSM?
- 2. AIM OF WSM?
- 3. DEF. OF WSM?
- 4. COMPONENTS OF WSM?
- 5. BENEFITS OF WSM?
- 6. CONCLUSION

1. WHAT IS WSM?

- **It is Land Management programme**
 - That looks at a region
 - With respect to Water related issues,
 - Starting from the Originating Points of Rivers
 - Till water joins into Ocean water stream

OR

- **IT IS USED TO MANAGE A RIVER FROM ITS SOURCE TO ITS TERMINATION/loss**

2. AIM OF WSM?

- 1. To hold back Rain Water(S)
- 2. Lessening down streams such that the rain water have enough time to percolate(seep into) into Sub-soil
 - **THUS ENHANCING GROUND WATER TABLE**

3. DEF.OF WSM?

- **“THE MANAGEMENT OF SINGLE UNIT OF LAND
WITH ITS DRAINAGE SYSTEM ”**

- **Rain water received at Mountain top/Hill-slopes**
 - **Flow down**
 - **In a group of Small Streams & Flow down**

And

- **Meet larger streams in the Valley(and forms Tributaries of Rivers)**

4. COMPONENTS OF WSM?

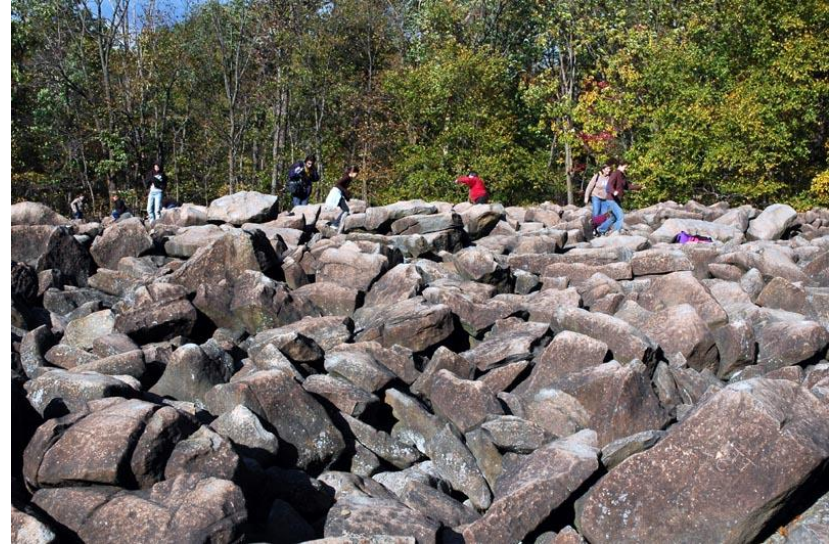
- 1. SOIL MANAGEMENT
- 2. VEGETATIVE COVER MANAGEEMNT
- 3. WATER MANAGEEMNT

- 1. SOIL MANAGEMENT:
- It is the First Technical Step

- By reducing the velocity of flowing waters(from Hill top/mountains; which is the originating point for Rivers)
 - BY
 - i) CONSTRUCTION OF STAGGERED TRENCHES: 6X2X1 ft=200 LTR) with downward Slope on the course of Flowing water
 - ii) CONSTRUCTION OF LOOSE BOULDERS/OBSTRUCTION WALLS: having Length = width of stream made with Stones at an interval of 200-300 mtr
 - iii) COUNTER BUNDS



STAGGERED TRENCHES



LOOSE BOULDERS/OBSTRUCTION WALLS





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COUNTER BUNDS

RESULT: OF SOIL MANAGEMENT

- Loss of soil particles(along with flowing water) can be prevention
- They hold Rain water
- Allow it to percolate into the ground
- Hence, underground stores of water are fully Recharged











iii) COUNTER BUNDS

- Is one of the simple method of soil and water conservation.
- Bunding is a embankment of earth.
- It plays an important role in soil and water conservation in the field with medium slope.
- In between two contours/lines agriculture can be practised.
- Along bunds trees which fixes nitrogen in to the soil are planted with grass along the bunds.



- 2. VEGETATIVE COVER MANAGEEMNT:
- Growing grasses/shrubs/planting trees(Local variety of species
 - Which HOLD SOIL &
 - Prevent s SOIL from being Carried away

- 3. WATER MANAGEEMNT

- i) by making NALA PLUGS

- ii) PERCOLATION TANKS

- iii) WELLS

- iv) CHECK DAMS

- AT

- The base of the Hill/Mountain such that the rain water will not Run-off during the time of Rain and thus gets stored ;giving room/ enough time for the water to Percolate into sub-soil and enhance the ground water table.

NALA PLUGS

- **Nala Plugs** are created to store rain water.
- By making such Nala Plugs, the stored water is used for farming.
- Benefiting the area of about 2 to 5 acers of land, located near the structure.
- At the end of the monsoon, the existing crops in the farm is benefited with water from these Nala Plugs & the crops are saved.



CHECK DAMS

- By constructing **Check Dams**, water stored is used for irrigation in the nearby farms.
- With the help of lift irrigation, the farmers are able to cultivate their crops not only during the monsoon but also during the winter and summer seasons as well.





Source: RWH Guide (CGWA)



4. BENEFITS OF WSM?

- i) can bring Local prosperity
- ii) improves Quality of life for the Locals
- iii) Enhances growth of Agricultural crops
- iv) even makes it possible to grow more than one crop in a year, in dry/semi-arid areas

5.CONCLUSION

- WSM is: Sound and Scientific way of Storing/ Conserving Rain water,
 - because
- i) it does not affect Ecological services and
- Ii)also does not require high Capital(as in the case of Dams)

- Watershed management (WSM)- **implies the wise use of soil, water and vegetation** of a watershed to get optimum production with minimum hazards to the natural resources of the concerned area.
- **It is a continuous process** to counter both man-made (roads, mining, logging, farming etc.) and natural events (floods, landslides, wildfire, etc.)
- WSM **enhances the growth of agricultural crops; makes it possible to grow more than one crop in a year.**

Objectives of watershed management

- Promote sustainable economic development through
 - (i) optimum use of land, water and vegetation
 - (ii) provide employment (and local capacity building)
- Restore ecological balance through sustainable development of natural resources and community participation
- Minimizing soil erosion and moisture retention so as to ensure good productivity land for farmers.
- To minimize the risk of floods, droughts and landslides.
- Beneficial development activities like domestic water supply, irrigation, hydropower generation.
- Improve living conditions of the poorer through more equitable resources distribution (water rights) and greater access to income generating activities

Causes of watershed degradation

- Overgrazing
- Deforestation
- Mining
- Construction activities
- Industrialization
- Natural and artificial fires
- Soil erosion

Watershed management Practices

- Water harvesting
- Afforestation
- Mechanical measures for reducing soil erosion & run-off losses
- Scientific mining and quarrying
- Public Participation

Case study: Pani Panchayat, Pune

- Mahur village in Pune District of Maharashtra - a drought prone area, not able to grow a good crop in most years.
- Scarcity of clean drinking water
- Initiation of Pani Panchayat by Vilasrao Salunkhe to conserve water in this drought prone area.
- Watershed development was initiated on a barren and uncultivated piece of land belonging to a temple.
- Out of the 16 hectares of land in the village, 9.6 hectares were brought under irrigation, 2.4 hectares was afforested and 4 hectares was converted into percolation tanks. Wells and field bunds were built.

Resettlement & rehabilitation of peoples

- Resettlement of peoples due to
 - Building of big Dams
 - Displacement due to mining
 - Displacement due to creation of National Parks
 - Displacement due to industrialization
- Case studies:
 - Hirakud Dam, Orissa displaced more than 20,000 peoples of 250 villages.
 - Jharia Coal fields, Jharkhand displaced around 0.3 million peoples
 - Valmiki Tiger reserves, Bihar displaced around 142 villages tribal people.
 - Tata Nano project, Sindur, WB, was shifted to Gujarat.

Problems and concern

- Disrupts the lives of the people (psychological pressure) who live in the project areas.
- Often requires relocation
- Socio-economic and ecological base of the local community is disturbed.
- The projects that are likely to displace people should not be carried out without the consent/permission of the local people.
- In India, people have been unfairly displaced by the construction of dams created since independence to drive the green revolution.
- Rehabilitation has not been implemented satisfactorily for decades.

- Resettlement requires alternate land. However, due to the lack of arable high quality land, project affected persons are given unusable wasteland.
- Even if the unusable wasteland is given, it is not adequately done.
- Resettlement not only puts pressure on the project affected people but also on the people who have been living in the area that has been selected for resettlement (both communities suffer and conflict over resources).

Case study (Tehri project)

- **The Tehri Dam** in the outer Himalayas in Uttar Pradesh, when finished will submerge Tehri town and nearly 100 villages. Since the dam was sanctioned in 1972, local people have been opposing the dam and resisting its construction.
- Little has been done to ensure proper rehabilitation and compensation for nearly a lakh of people who will be uprooted from their homes as a result of this dam, with little hope of rehabilitation as no alternative land is available.
- There is also emotional and psychological trauma caused by forcibly removing people from their homeland where their families have lived for centuries.

Environmental Ethics(EE)

- **Ethics :**
- **Environmental Ethics:**
- **Issues related to EE:**
- **Possible solutions:**

Ethics :

- Branch of philosophy that deals with morals(means ability of a person to judge what is right and what is wrong)
- Philosophy: the use of reason and argument in seeking truth and knowledge of reality
- Morals: means ability of a person to judge what is right and what is wrong

Environmental Ethics:

- MEANS RESPECTING ALL FORMS OF LIFE
 - AND
 - ALL THE PROCESSES THAT SUSTAIN IT(LIFE)
- EXAMPLE OF THE PROCESSES THAT SUSTAIN LIFE ARE:
 - i) hydrological cycle
 - ii) purification of oxygen by plants
 - iii) soil microorganisms that converts ammonical form of nitrogen into Nitrate form for plants usage
 - iv) construction of houses/shelter by human and other

Issues related to EE:

- 1. rights of individuals that are fundamental to life
- 2. well-being of all individuals today and also that of future generations
- 3. also relates to the rights of other living creatures

Possible solutions:

- 1. equitable use of resources
- 2. Sharing of resources among all the humans
- 3. our perspective/ thinking on the environment (human centric/ environment centric)
- 4. love and honor mother earth
- 5. we should not feel “ humans as master of nature; but one among all the living creatures on the biosphere”
- 6. we do not have right to cause over exploitation of other species
- 7. we should limit our family size
- 8. we can have fun; make time to enjoy life, enjoy natures beauty, friendship and love

Environmental Ethics

- **Environmental ethics** – deals with issues related to the rights of individuals that are fundamental to: i) life/live and ii) well-being.
- **Environmental destruction** is **largely caused by the consumption of the rich** and the **worst sufferers of environmental destruction are the poor.**
- **Among the poor**, the worst sufferers are the marginalized cultures and occupations, and **most of all, women.**
- If we care for the poor, we cannot allow the Gross Natural Product to be destroyed any further.

- Gross Natural Product will be enhanced only if we can arrest and reverse the growing alienation between the people and the common property resources.
- **Resource consumption patterns and the need for equitable utilization (Anil Agarwal, 1985 – Status of India's Environment)**

- **Equity-disparity in the northern and southern countries**

- People living in the economically advanced nations use greater amount of resources and energy per individual and also waste more resources.
- This is at the cost of poor people who are resource dependent and live in developing nations.

- **Urban-rural equity issues**

- The common property of rural communities has increasingly been used to supply the needs of the urban sector.
- The commons of the rural sector are being depleted of their resources. While the cities get richer, the rural sector get poorer.

- **The need for gender equity**

- In rural sector, women work longer than men.
- Lower access to education and health for girl children.
- Women have not been given equal opportunity to develop.

- **Preserving resources for future generations**

- Overuse and misuse of resources
- Concern for preserving species and natural undisturbed ecosystems

- **The ethical basis of environment education and awareness**

- Supreme Court of India – Every young individual at school and college level must be exposed to a course on environment.
- Not only to create awareness but also to bring about pro-environmental action.

- **The rights of animals**

- Not only the right to life, but also to the right to a dignified existence.

- **The conservation ethic and traditional value systems of India**

- Tulsi plant grown in every house

- Vehicle of different Gods (vahan)



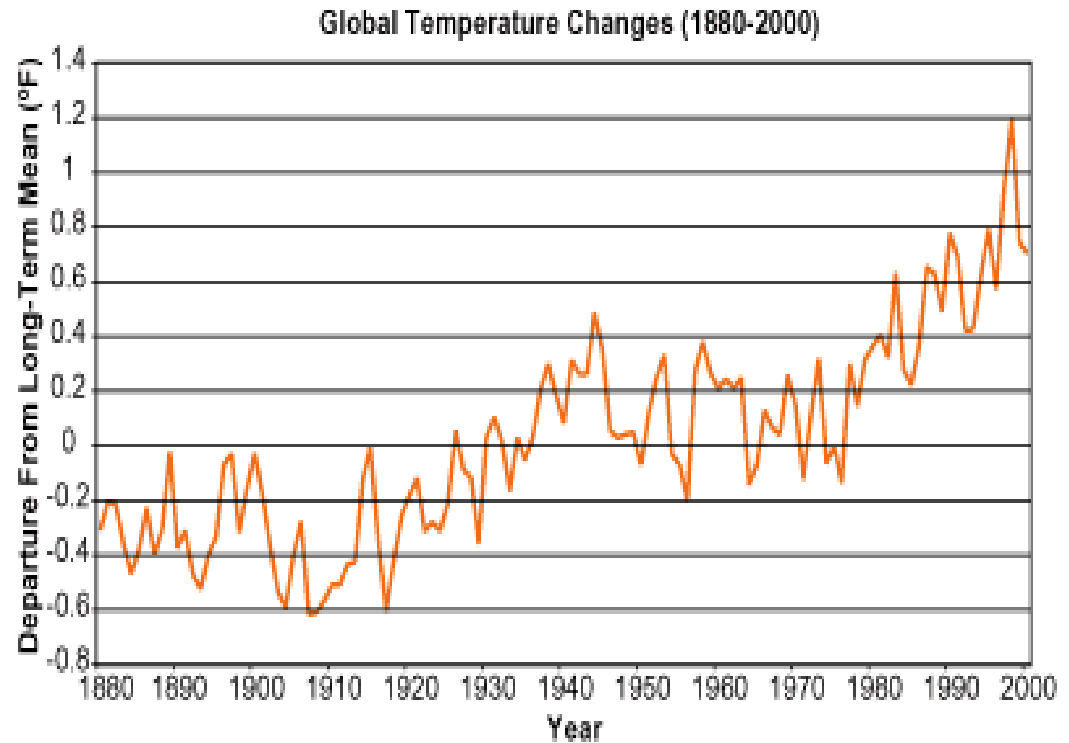
Global Warming

What is Global Warming?

An increase in the average temperature of the Earth's atmosphere and oceans

Global temperature on both land and sea increased by 0.6 ± 0.2 °C over the past century

Volume of atmospheric CO₂ increased from 280 ppm in 1800 to 367 ppm in 2000, a 31% increase over 200 years.



Source: U.S. National Climatic Data Center, 2001

Our Changing Climate

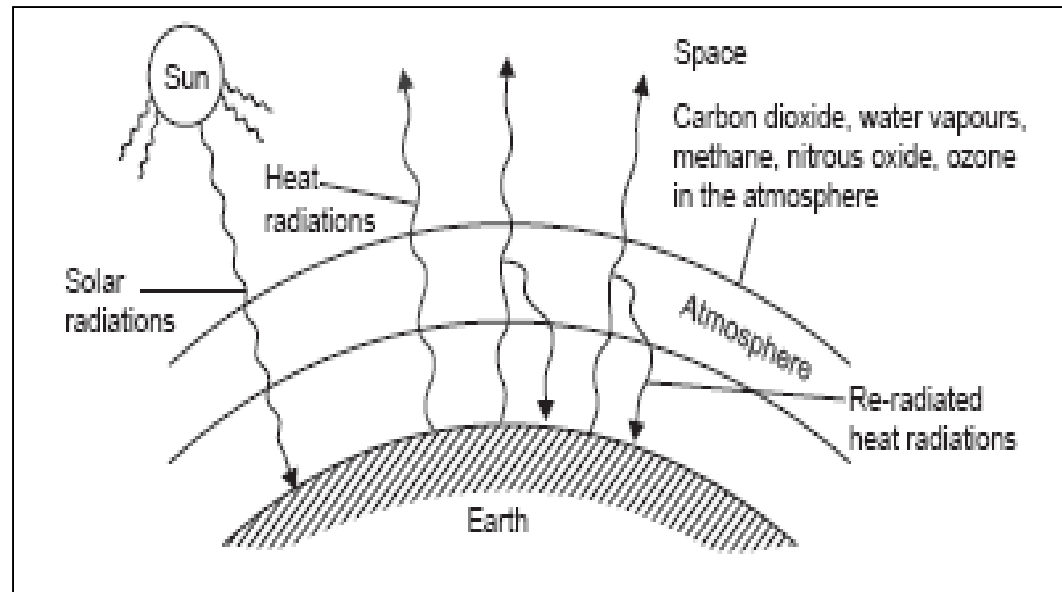
- The snow cover in the Northern Hemisphere and floating ice in the Arctic Ocean have decreased.
- Sea level has risen 4-8 inches over the past century.
- Global surface temperature could rise 0.6-2.5°C in the next 50 years, and 1.4-5.8°C in the next century.



What causes it?

Human Impacts-

Atmospheric greenhouse gases trap some of the outgoing energy, retaining heat.



Greenhouse Gases -

CO_2

Methane

Nitrous oxide

Fluorinated compounds

Since industrial revolution, atmospheric concentrations of CO_2 increased 30%, methane more than doubled, nitrous oxide risen by 15%.

These increases have enhanced the heat-trapping capability of the earth's atmosphere.

- About 75% of the solar energy reaching the Earth is absorbed by the Earth's surface and the rest is radiated back to the atmosphere.
- Some of the heat is trapped by greenhouse gases, mostly CO₂.
- As CO₂ released by the various human activities is rapidly increasing, it results in global warming.
- The average surface temperature is about 15°C (33°C higher than it would be in the absence of the greenhouse effect, i.e. with a mean air temperature of -18°C).
- Greenhouse Gases: CO₂, CH₄, N₂O, O₃, CFCs, HCFCs, Methyl Chloroform(CH₃CCl₃), CCl₄, SO₂, F, Br, I, etc.

- CO₂ causes 55 % of Global warming.
- In 1990, CO₂ concentration in the atmosphere was 355 ppm which is increasing at a rate of 1.5 ppm/yr.
- CO₂ in the atmosphere has increased by 31% since pre-industrial times, which will help in trapping more heat in the lower atmosphere.

CFCs

- It causes 24 % of Global warming.
- It also deplete the Ozone Layer.
- It traps 1500 – 7000 times more heat than CO₂.
- Atmospheric concentration of CFCs is 0.00225 ppm which is increasing at a rate of 0.5 % annually.
- It stays in the atmosphere 65 – 110 yrs to deplete the Ozone layer.

CH₄

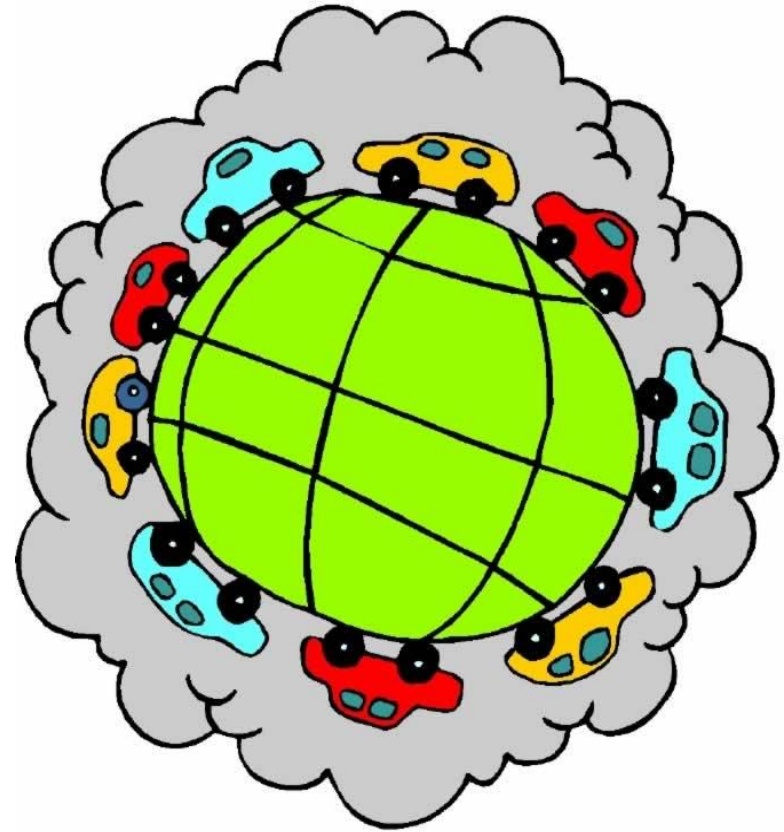
- It causes 18 % of Global warming.
- It traps 23 times more heat than CO₂.
- Atmospheric concentration of CH₄ is 1.675 ppm which is increasing at a rate of 1% annually.
- It stays in the atmosphere 7 – 10 yrs.

N₂O

- It causes 6% of global warming.
- It stays in the atmosphere for 140 – 190 yrs.
- It traps about 230 times more heat than CO₂.
- Atmospheric concentration of N₂O is 0.3 ppm and is increasing at a rate of 0.2 % annually.

Greenhouse Gas Emissions - Sources

- * Combustion of fossil fuels → coal-burning power plants, automobile exhausts, factory smokestacks, other waste vents of the human environment contribute 22 billion tons of CO₂ and other greenhouse gases each year.
- Animal agriculture, manure, natural gas, rice paddies, landfills, coal, and other anthropogenic sources contribute about 450 million tons of CH₄ each year.
- Atmospheric concentrations of CO₂ and CH₄ have increased by 31% and 149% respectively above pre-industrial levels since 1750.



Greenhouse Gas Emissions - Sources

Power Plants

40% of carbon dioxide emissions stem from the burning of fossil fuels for the purpose of electricity generation

Cars

20% of carbon dioxide emissions comes from the burning of gasoline in internal-combustion engines of cars and light trucks with poor gas mileage contribute the most to global warming

Trucks

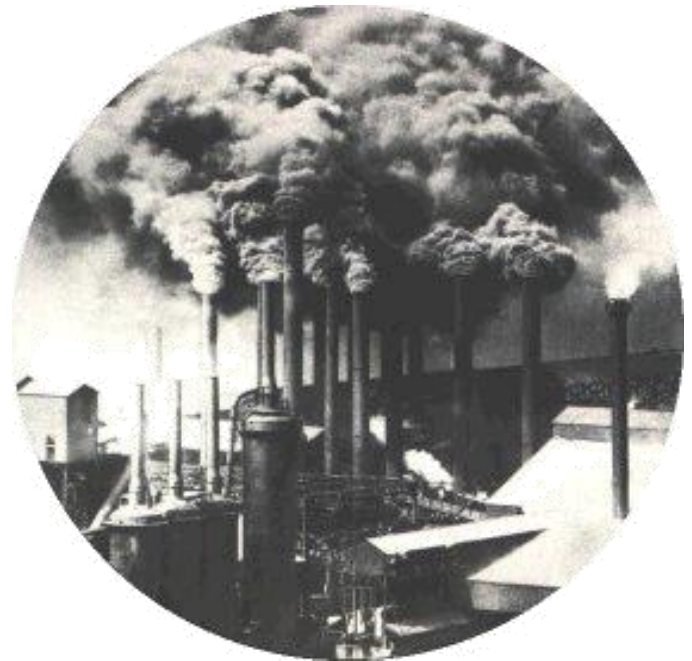
Another 13% of carbon dioxide emissions come from trucks used mostly for commercial purposes

Airplanes

Aviation causes 3.5 percent of global warming, and the figure could rise to 15 percent by 2050

Carbon Dioxide from Buildings

Buildings structure account for about 12% of carbon dioxide emissions



Effects of Global Warming

Negative Effects

Rising Sea Level

Change of precipitation and local climate conditions; acid rain

Alteration of forests and crop yields

Expansions of deserts into existing rangelands

More intense rainstorms

Destabilization of Ocean currents



Positive Effects

Can stimulate plant growth in places where CO_2 and temperature are the limiting factors (preventing photorespiration which can destroy existing sugars)

Melting Arctic ice may open the Northwest Passage in summer, which would cut 5,000 nautical miles from shipping routes between Europe and Asia

Issues

- Warming of the earth's surface
- Precipitation patterns will be changed (some areas dryer and some areas wetter)
- Seasonal patterns will change due to the change of temperature and precipitation
- Soil moisture regimes will change due to change in precipitation and evaporation.
- Decrease in cloud cover will enhance the solar heating of the surface and increase the land-sea temperature contrast – tropical monsoons will be driven with more severity and intensity
- Wind direction and stress over the sea surface will change that may alter the productivity of the oceans.

Solutions

- Cut down the current use of CFCs and fossil fuels.
- Use energy more efficiently.
- Shift to renewable energy resources.
- Increase nuclear power plants for electricity production.
- Trap and use methane as a fuel.
- Stabilize population growth.
- Efficiently remove CO₂ from stack gases.
- Planting more trees.
- Remove atmospheric CO₂ by utilizing photosynthetic algae.
- Automobile usage should be minimized by walking, cycling or public transportation – N₂O comes from the exhaust

What Can be Done: Alternatives

Renewable Energy Sources



DTE solar array in Southfield, MI



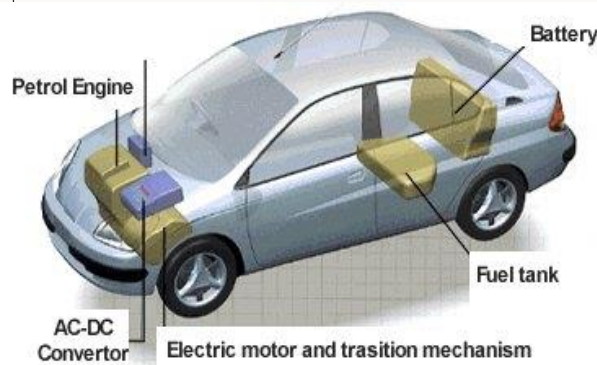
Solar Energies

Wind Power

Biomass

Geothermal

Changes In Vehicle Systems



Hybrid



Fuel Cell



Battery-Electric

Damage to coral reefs, Pacific ocean

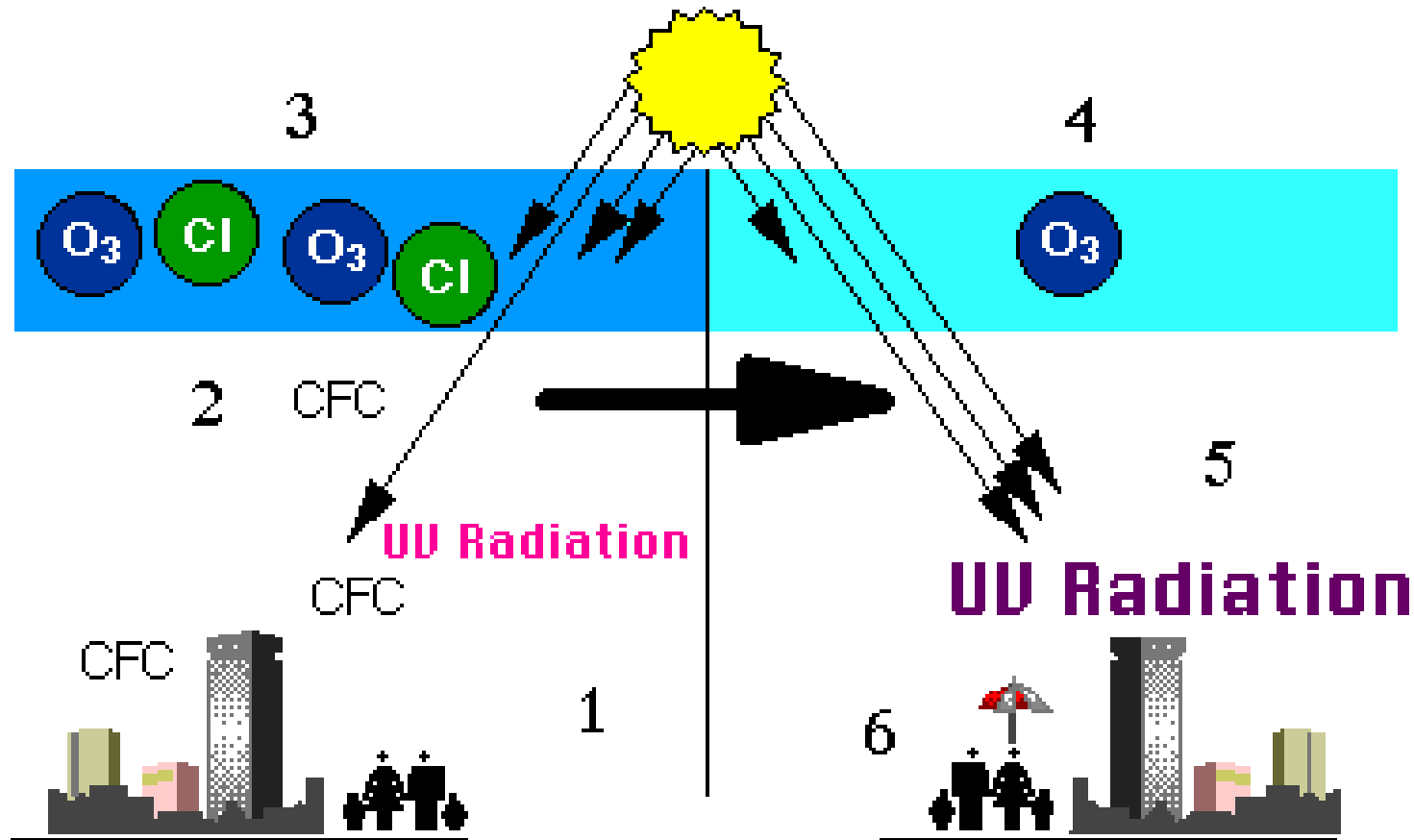


- Worst ever death of coral reefs in 1997 in the Pacific - About 10% of the Earth's coral reefs were dead, another 30 % were seriously affected and another 30% were degraded.
- The Global Coral Reef Monitoring Network Townsville, Australia, has predicted that all the reefs could be dead by 2050.

Butterfly populations in the UK

- Global warming is leading to an early arrival of butterflies in Britain. Scientists say that butterflies can now be spotted much earlier every year in the last two decades. Some, like the red admiral, can now be seen a month earlier than was the case in the mid – 1970s. Others, like the peacock and the orange tip are appearing between 15 and 25 days earlier than in the past. Future rise in temperature is likely to have a detrimental effect on these butterflies. Some butterflies which need cooler temperatures might suffer.

Ozone layer depletion



- 1 - CFCs released
- 2 - CFCs rise into ozone layer
- 3 - UV releases Cl from CFCs

- 4 - Cl destroys ozone
- 5 - Depleted ozone → more UV
- 6 - More UV → more skin cancer

- Ozone is formed by the action of sunlight on oxygen. It forms a layer (20 to 50 km) above the surface of the earth. This action takes place naturally in the atmosphere, but is very slow.
- The ozone layer in the upper atmosphere absorbs the sun's harmful UV radiation, preventing it from reaching the earth's surface.
- 1980s - scientists detected a thinning of the ozone layer in the atmosphere above Antarctica. This phenomenon is now being detected in other places as well including Australia.

Issues

- Ozone is a **highly poisonous** gas with a strong odor.
- It is considered a pollutant at ground level and constitutes a health hazard by causing respiratory ailments like asthma and bronchitis.
- The destruction of the ozone layer is seen to cause increased cases of skin cancer and cataracts.
- It also causes damage to certain crops and to plankton, thus affecting nature's food chains and food webs.
- 1970s – discovery of CFCs, used as refrigerants and aerosol spray propellants, that pose threat to the ozone layer.

- The CFC molecules are virtually indestructible until they reach the stratosphere, where UV radiation breaks them down to release chlorine atoms. The chlorine atoms react with ozone molecules which break down into oxygen molecules, which do not absorb UV radiations.
- Although the use of CFCs has been reduced and now banned in most countries, other chemicals and industrial compounds such as bromine, halocarbons and nitrous oxides from fertilizers may also attack the ozone layer.

Solutions

- **Montreal protocol, September 16, 1987** – an international treaty designed to protect the ozone layer by phasing out the production of numerous substances believed to be responsible for ozone depletion.
- Use of CFCs to be banned by the year 2000, slow recovery of ozone layer over a period of about 50 years

Consumerism and waste products

- Consumerism - consumption of resources by the people
- **Consumerism** - related to the constant quest/mission for purchasing of new goods,
 - **WITH**
 - little attention to their true need,
 - durability,
 - product origin,
 - or
 - On the environmental consequences of their manufacture and disposal.

WHO ARE THE CHIEF CONTRIBUTORS FOR CONSUMERISM

- High income group people of Developed nations
- Higher growth of “Affluent societies” of urban/megacities
peoples of developing nations

REASONS FOR CONSUMERISM

- 1. Industrial growth
- 2. High levels of advertisement by manufacturing companies
- 3. New marketing strategies by companies
- 4. Psychological obsolescence (before the product actually wears out).
- 5. social status (or) personal feeling of purchasing all new items/products (or) creating desire to follow **NEW** trends

EFFECTS OF CONSUMERISM

- **1. Interferes with the sustainable use of resources**
- **2. Faster depletion of natural resources**
- **3. Widening the in-equalities of resources**

consumption in different societies

- Serious environmental problems due to increasing and unsustainable consumption (e.g. in affluent/rich societies) of natural resources.
- Industrialized countries - **make up 20% of the world population but consume 80% of the world's resources and produce 80% of wastes.**

Consumerism and waste generation – A comparison

Parameter	Percent global values	
	USA	India
Population	4.7	16
Production of Goods	21	1
Energy Use	25	3
Pollutants/wastes	25	3
CFC's production	22	0.7

More and more No. of affluent society families ; more waste generation, more resources drawn from the nature.

- Increasing demands of consumption, increasing level of environmental pollution, and the problems of waste disposal can be solved by strictly following the 4R principle.
- **4R examples:** Conversion of the residual waste into a useable resource. One industry's waste could be a valuable resource for another industry, e.g. use of bagasse from sugar industry as a raw in the paper industry.

- **Disposable culture** in the developed world – 200 billion cans, bottles, plastic cartons and paper cups, are thrown away each year.
- **Attitudes of people** in developed countries & Urban industrial communities (generating large quantities of “plastic/paper/leather/tin cans/bottles/mineral refuse) has led to disastrous effects on the Environment and over exploitation of natural resources.

- Increasing demands of consumption, increasing level of environmental pollution, and the problems of waste disposal can be solved by strictly following the 4R principle.
- **4R examples:** Conversion of the residual waste into a useable resource. One industry's waste could be a valuable resource for another industry, e.g. use of bagasse from sugar industry as a raw in the paper industry.

Solutions to the Consumerism

- **1. reduce demands for resources consumption**
- **2. reduce level of Pollution**
- **3. careful/Scientific disposal of Waste by following
the principles of 3R's**