6. Social Issues & the Environment

Environmental Issues

- A variety of environmental problems now affect our entire world. As globalization continues & the earth's natural processes transform local problems into international issues, few societies are being left untouched by major environmental problems.
- Some of the largest problems now affecting the world are- Acid rain, Air Pollution, Global Warming, Hazardous waster, Ozone depletion, smog, water pollution, Over population & rain forest destruction.

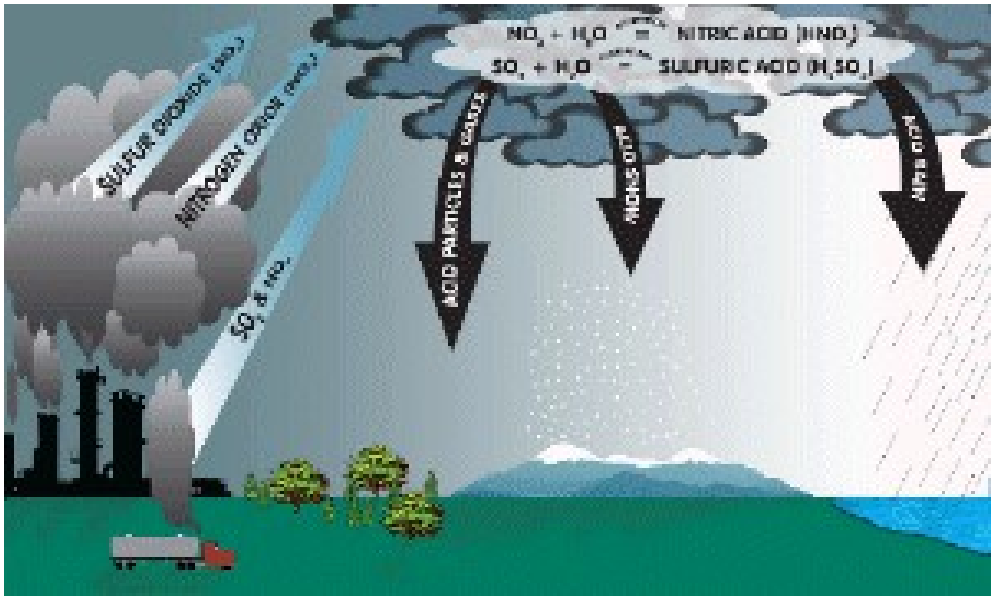
Acid Rain

- The term acid rain refers to acid deposition. It is caused by Airborne acidic pollutants & has highly destructive results.

- Acid rain, one of the most important environmental problems of all, can not be seen. The invisible gases that cause acid rain usually come from automobiles or coal burning power plants.

What is Acid Rain

- Formed when gases, such as CO_2 and SO_2 react with the water in the atmosphere
- The pH of Rain drops
  - As low as pH of 5
  - Very harmful to our living environment



Examples

- When CO_2 reacts with water, carbonic acid is formed.

  $CO_2\ (g)+H_2O(l)\text{-}\rightarrow H_2CO_3(aq)$

- When SO_2 reacts with water, sulfurous acid is formed.

  $SO_2\ (g)+H_2O(l)\text{-}\rightarrow H_2SO_3(aq)$

- When NO_2 reacts with water, nitric acid is formed.

  $2NO_2(g)+H_2O(l)\text{-}\rightarrow HNO_2(aq)+HNO_3(aq)$

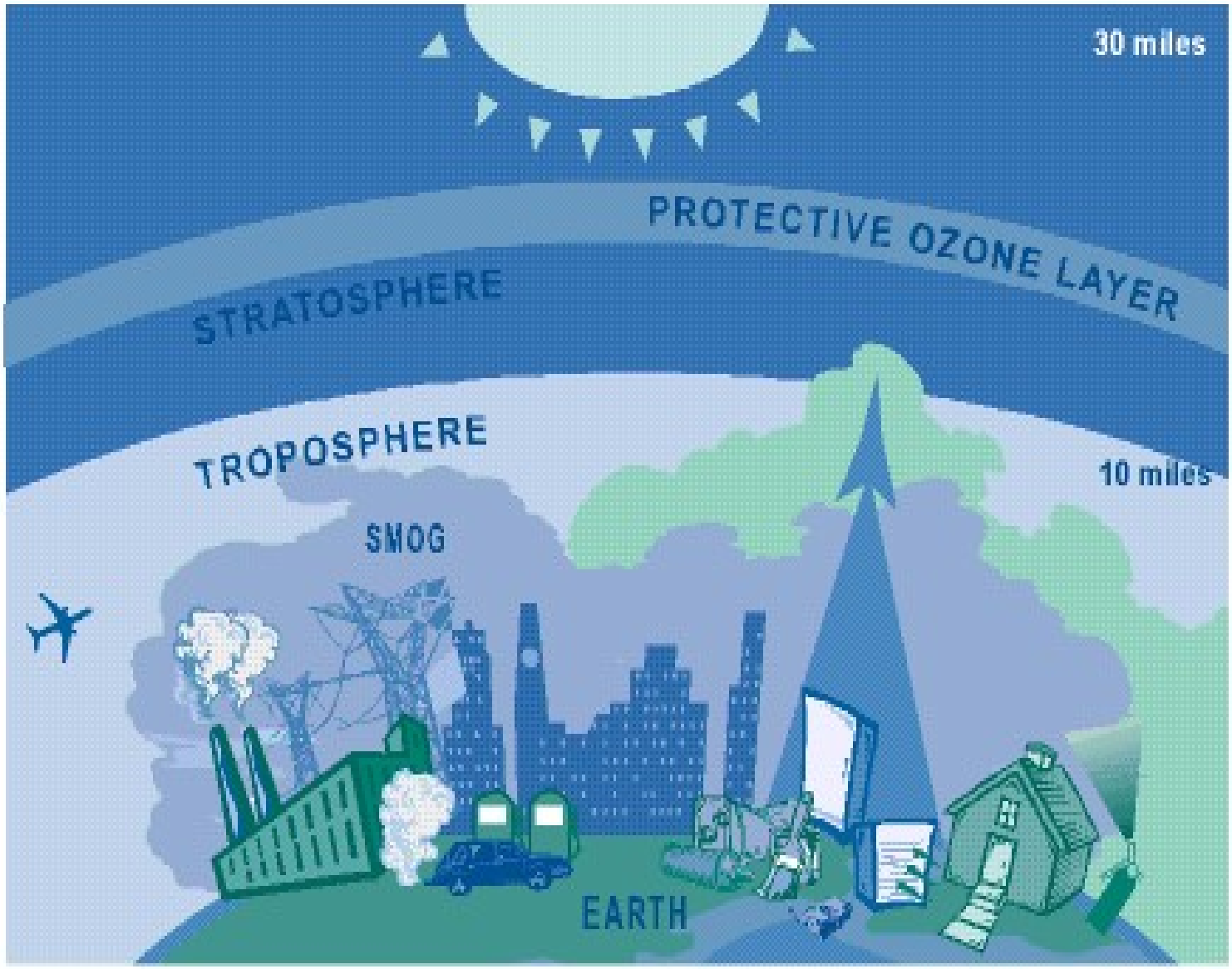
How does Acid Rain effect us

- It kills micro-organisms
- It poisons plants
- It damages metals and limestone
- It kills fish

Ozone layer depletion

Ozone O_3

- **A gas composed of three atoms of oxygen**
- bluish gas that is harmful to breathe
- Nearly 90% of the Earth's ozone is in the stratosphere and is referred to as the ozone layer
- Ozone absorbs a band of ultraviolet radiation called UVB


30 miles
PROTECTIVE OZONE LAYER
STRATOSPHERE
TROPOSPHERE
10 miles
SMOG
EARTH

Ozone-Depleting Substance(s) (ODS):

- CFCs
- HCFCs
- halons
- methyl bromide
- carbon tetrachloride and
- methyl chloroform

Various sources

Effects of OLD

-Skin Cancer

-Premature aging of the skin and other skin problems

-Cataracts and other eye damage

-Immune system suppression

What can we do?

- Make sure that technicians working on your car air conditioner, home air conditioner, or refrigerator are certified by an EPA approved program to recover the refrigerant (this is required by law).
- Have your car and home air conditioner units and refrigerator checked for leaks. When possible, repair leaky air conditioning units before refilling them.

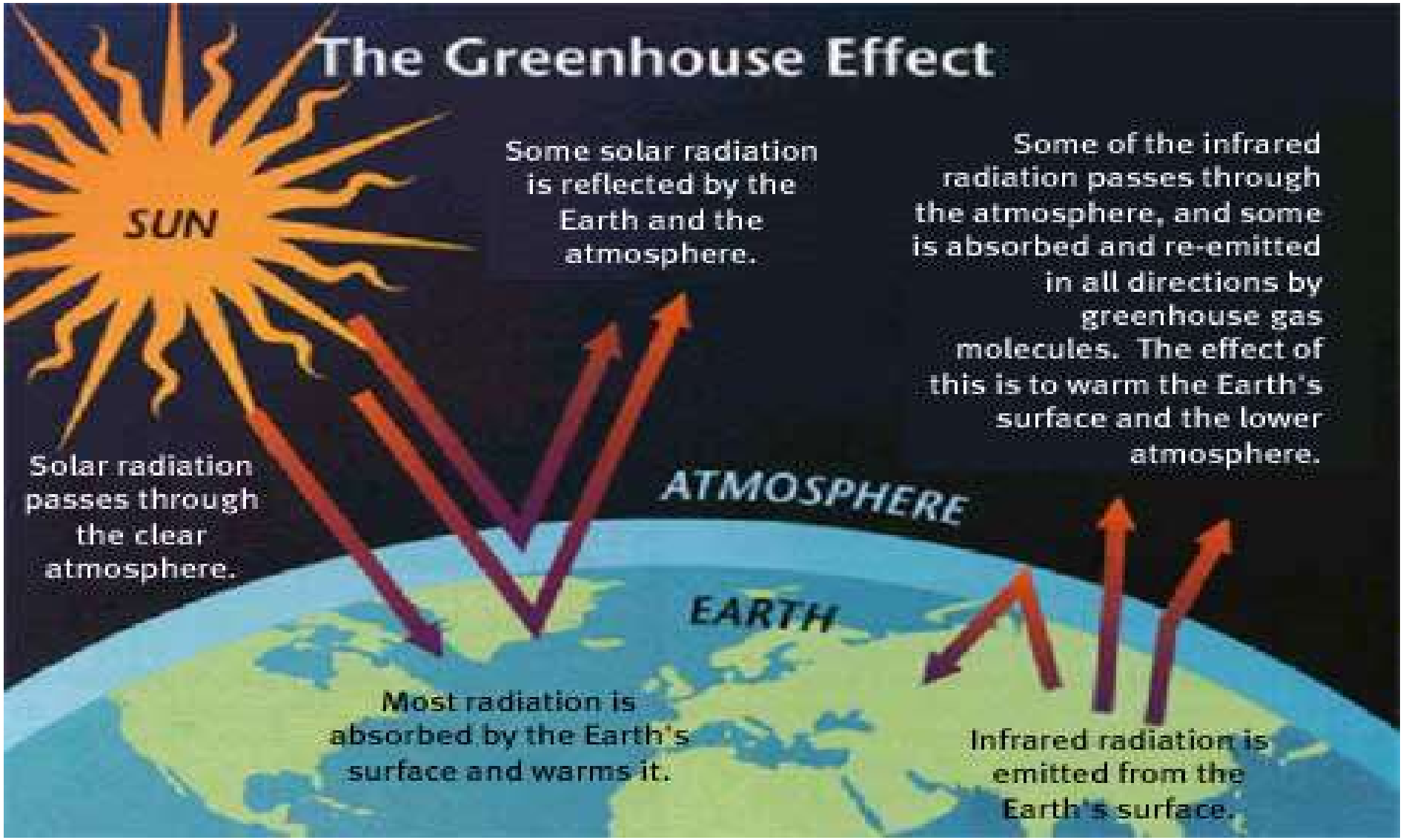
What can we do?

- Contact local authorities to properly dispose of refrigeration or air conditioning equipment.
- Protect yourself against sunburn. Minimize sun exposure during midday hours (10 am to 4 pm). Wear sunglasses, a hat with a wide brim, and protective clothing with a tight weave. Use a broad spectrum sunscreen with a sun protection factor (SPF) of at least 15 and 30 is better.

GREEN HOUSE EFFECT

- The greenhouse effect is **a natural process that warms the Earth's surface**. When the Sun's energy reaches the Earth's atmosphere, some of it is reflected back to space and some is absorbed and re-radiated by greenhouse gases. The absorbed energy warms the atmosphere and the surface of the Earth.

- The primary greenhouse gases in Earth‘s atmosphere are water vapor (H2O), carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and ozone(O_3)


The Greenhouse Effect
SUN
Some solar radiation is reflected by the Earth and the atmosphere.
Some of the infrared radiation passes through the atmosphere, and some is absorbed and re-emitted in all directions by greenhouse gas molecules. The effect of this is to warm the Earth's surface and the lower atmosphere.
Solar radiation passes through the clear atmosphere.
ATMOSPHERE
EARTH
Most radiation is absorbed by the Earth's surface and warms it.
Infrared radiation is emitted from the Earth's surface.

What can We do?

- Keep your automobile well tuned and maintained.
- Carpool, use mass transit, walk, bicycle, and/or reduce driving, especially on hot summer days.
- Be careful not to spill gasoline when filling up your car or gasoline-powered lawn and garden equipment. During the summer, fill your gas tank during the cooler evening hours.

What can we do?

- Make sure your car's tires are properly inflated and your wheels are aligned.
- Participate in your local utility's energy conservation programs.
- Seal containers of household cleaners, workshop chemicals and solvents, and garden chemicals to prevent VOC from evaporating into the air. Dispose of them properly.

Increase in CO_2

- Increased by the burning of fossil fuels- coal, oil, and gas
- Too much is harmful to our planet
- Creates a cycle of

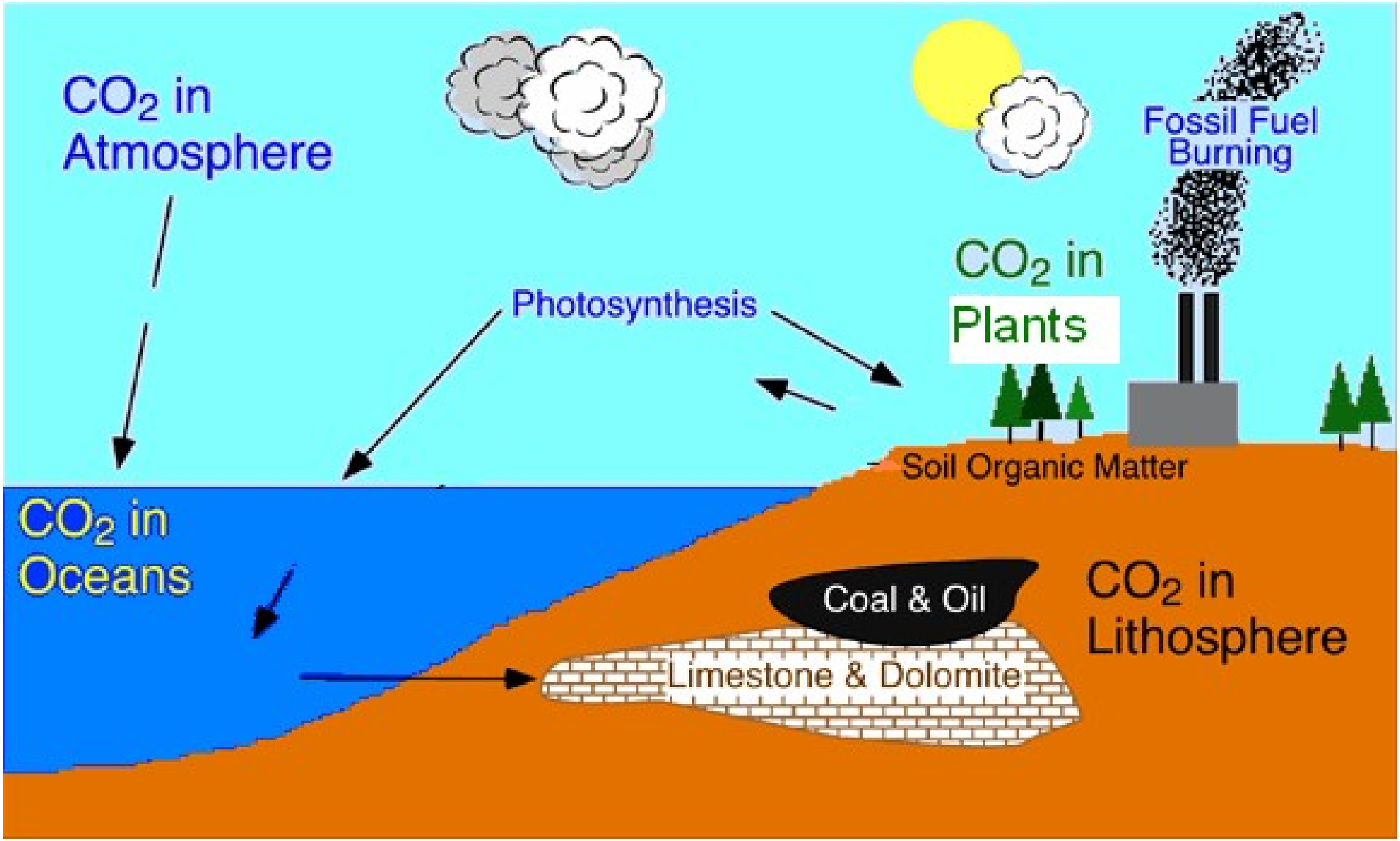
  Carbon Dioxide

  within our atmosphere
- Contributes to the

  hole in the ozone

  layer

Carbon Dioxide Cycle



Water Conservation

- Clean water is becoming increasingly scarce globally.
- With deforestation surface runoff increases and the sub soil water table drops.
- As many areas depend on wells, it has become necessary to go on making deeper and deeper wells. This adds to the cost and further depletes underground stores of water.
- Another serious problems caused by rapid surface flow of water during the rains, which leads to extensive floods with loss of life and property.

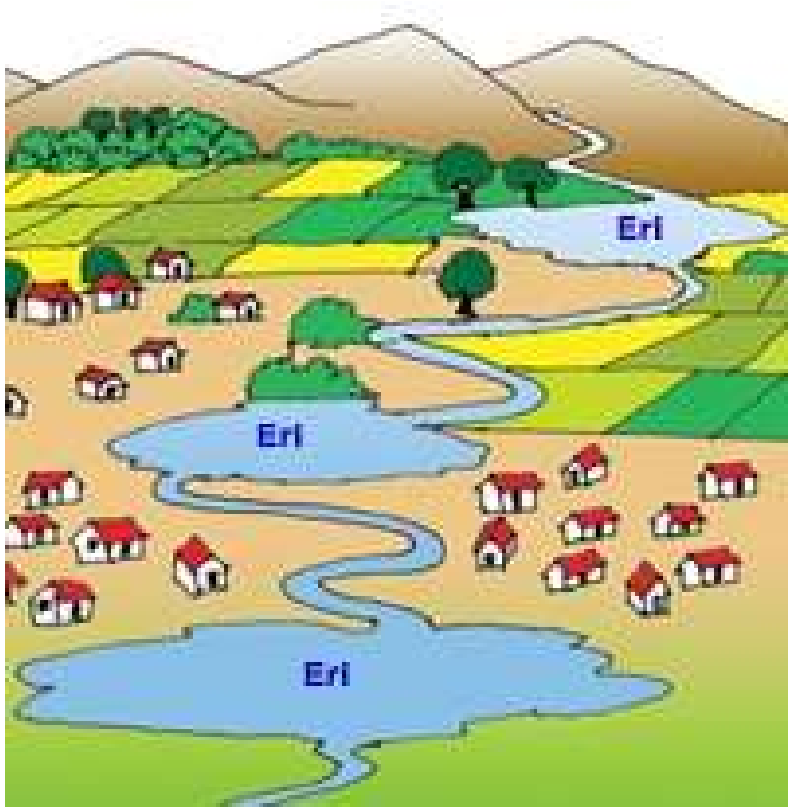
Water Conservation

- Water has to be equitably and fairly distributed so that household use, agriculture and industry all get a share of the water.
- Serious shortage of potable drinking water.
- Traditional systems of collecting water and using it optimally have been used in India for many generations.
- As women had to carry water to their homes over long distances, this was a time consuming and laborious activity, thus the water could not be wasted.

Water Conservation

- During the British period many **dams** were built across the country to supply water especially to growing urban areas. Post independence, India's policy on water changed towards building large dams for expanding agriculture to support the **green revolution**. While this reduced the need to import food material and remove starvation in the country, the country began to see the effects of serious water shortages and problems related to its distribution.
- The newer forms of irrigated agriculture such as sugarcane and other water hungry cash crops requires enormous quantity of water. Finally however, such irrigated areas become waterlogged and unproductive.

Water Conservation



Total water management for sustainable development?.

Water Conservation

- Water conservation means **reducing the usage of water and recycling** of waste water so that recycled water can be used for different purposes as cleaning, manufacturing and agricultural irrigation.
- Water conservation measure is an **action, behavioral change, device, technology or improved design or process** implemented to reduce water loss, waste or use.

- **Water efficiency** is a tool of water conservation that results in **more efficient water use and thus reduce water demand**
- Water conservation can be done by, **any beneficial reduction in water loss, use or waste as well as the preservation of water quality, reduction in water use and improved water management practices** that reduce or enhance the beneficial use of water.

Water Conservation methods

A. Household/Indoor applications

- Leak proof taps and repair dripping taps by replacing washers.
- Avoid unnecessary flushing of toilets, use sensor fixture.
- Turn off tap while brushing and shaving and use mug.
- While soaping and rinsing clothes turn off taps.
- Provide overflow valve to avoid overflow in overhead tanks.
- Do not use running water to release ice form tray.
- Do not use extra detergent for cloth washing.
- Do not use showers and big bathtubs in bathrooms.
- While going outdoor turn off main water valve.
- Always monitor water meters.
- Rain water can be used for domestic purposes with minor treatment.

Water Conservation methods

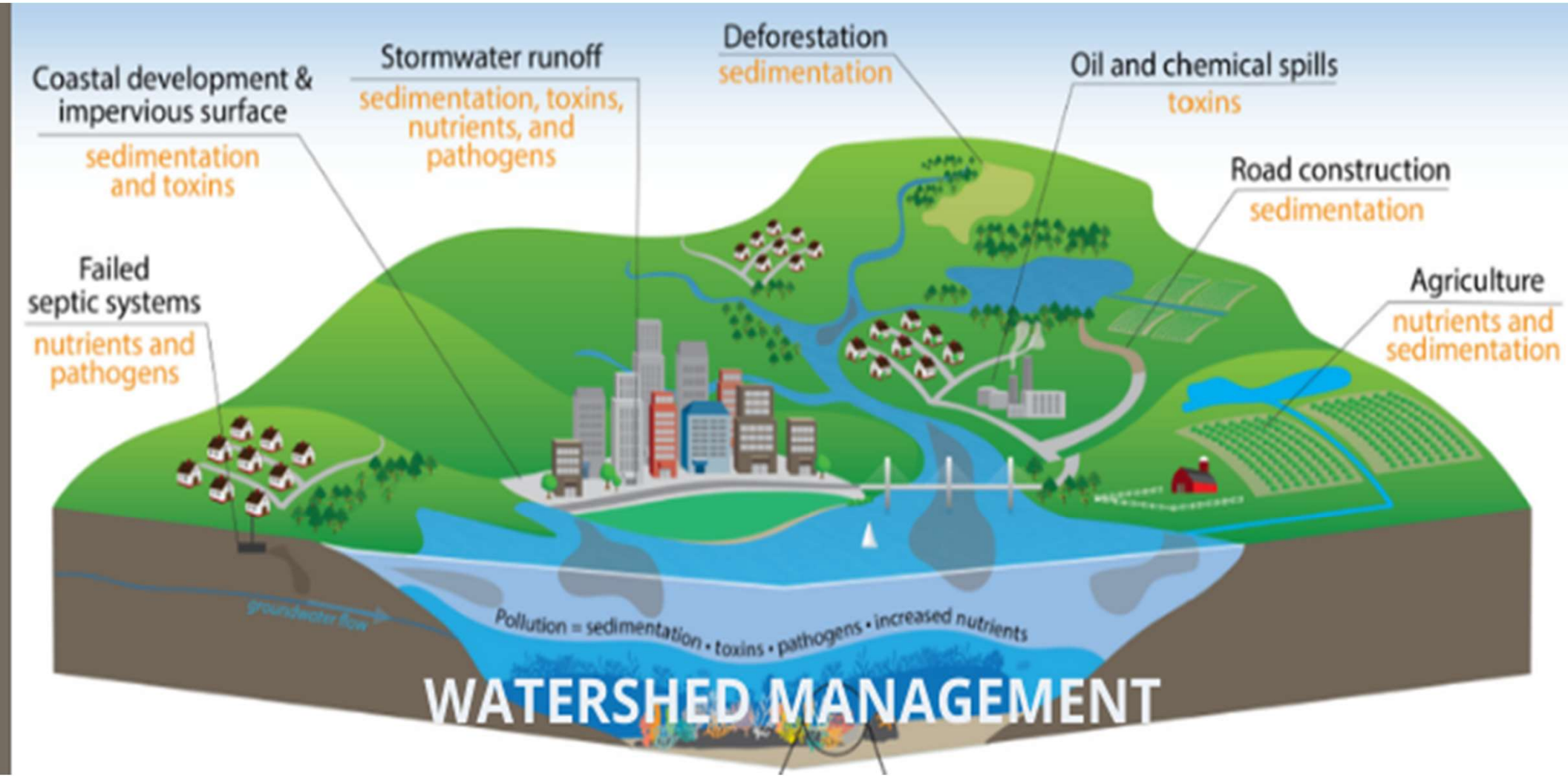
B. Commercial applications

- Waterless urinals.
- Waterless car washing.
- Use of Pressurized water brooms instead of jet hose for cleaning footpaths.
- Use of steam sterilizers in hospital and health care facilities.
- Rain water harvesting.

Water Conservation methods

C. Outdoor/Agriculture applications

- Minimize grass lawns.
- Do not over water grass lawns.
- Apply water on lawns during morning.
- Use dish & cloth wash water for lawns and floor cleaning.
- Check leaks in pipe and hose.
- Use sprinkler and drip irrigation methods.
- Do not wash floor with hose use brooms.
- Avoid over fertilizing lawns to increase need of water.


Coastal development & impervious surface
sedimentation and toxins
Stormwater runoff
sedimentation, toxins, nutrients, and pathogens
Deforestation
sedimentation
Oil and chemical spills
toxins
Road construction
sedimentation
Failed septic systems
nutrients and pathogens
Agriculture
nutrients and sedimentation
groundwater flow
Pollution = sedimentation • toxins • pathogens • increased nutrients
WATERSHED MANAGEMENT

Watershed Management

- A watershed is defined as the land area from which water drains under gravity to a common drainage channel.
- Watershed management is the study of the relevant characteristics of a watershed aimed at the sustainable distribution of its resources and the process of creating and implementing plans, programs and projects to sustain and enhance watershed functions that affect the plant, animal and human communities within watershed boundary.

Watershed Management

- This is a land management program that looks at a region from the perspective of all its water related issues.
- Saving water from its local source by allowing it to percolate into the ground instead of allowing it to run off rapidly along the surface during the monsoon, is a major aspect of good watershed management.
- This allows underground aquifers to fill so that ground water is recharged. Deforestation is a major cause of poor water supply. Afforesting such degraded areas is an important aspect of watershed management.

Watershed Management

- Watershed management is the integrated use of land, vegetation and water in a geographically discrete drainage area for the benefit of its residence with the objective of protecting or conserving the hydrologic services that the watershed provides and of reducing or avoiding negative downstream or groundwater impacts.
- Alterations in watershed results in natural soil erosion, changes in farming system, excessive extraction of water, overgrazing, deforestation and pollution.

Watershed Management

- Features of watershed includes water supply, water quality, drainage, storm water runoff, water rights and overall planning and utilisation of watersheds.
- Landowners, land use agencies, storm water management experts, environmental specialists, water users and communities all are integral parts of watershed.
- The management approaches are needed in land and water resources, upstream land use and impact on downstream, resource depletion, poverty, stakeholders and climate.

Cause of Watershed deterioration

- Faulty and bad management of resources by human and animals.
- Faulty agriculture, forestry and grassland management leading to degradation of land.
- Faulty road alignment and constructions.
- Industrialization.
- Forest fires.
- Less interest of people.

Effect of Watershed deterioration

- Less production from agriculture, forest and grass lands.
- Increase in erosion of soil and decrease in biomass production.
- Rapid alteration of reservoirs, lakes and river beds.
- Less recharge of water and lowering of water table.
- Poverty as a result of less food productions.

Methods of Watershed Development

- Contour bunding.
- contour trenching.
- contour stone walls.
- Bench terraces.
- Land leveling.
- Summer ploughing.
- Agro forestry with suitable species.
- Vegetative barriers.
- Check dams.
- Retaining walls.
- Farm ponds and percolation dams.
- Renovation of existing water bodies and inlet channels.