

Unit 1: Introduction & natural resources



Surrounding





Environment

Everything around us



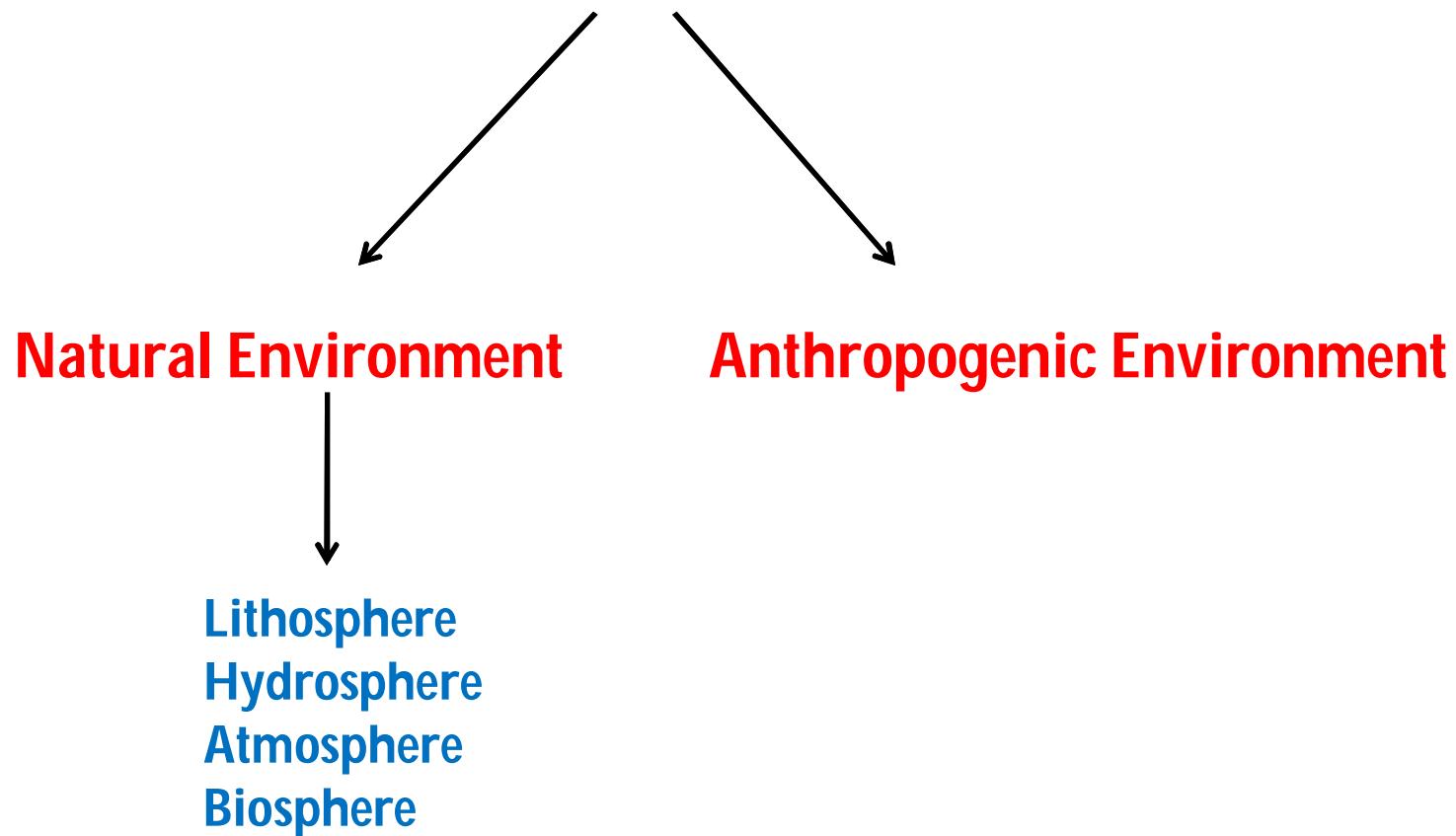


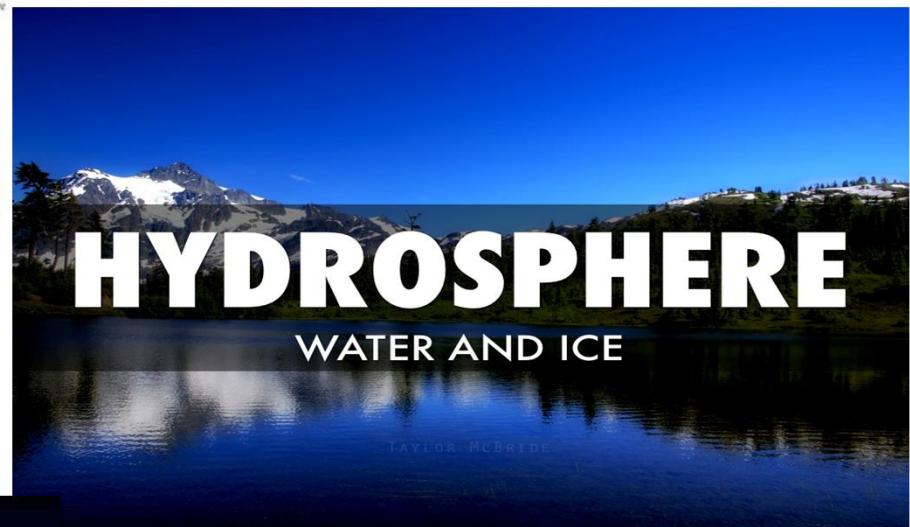
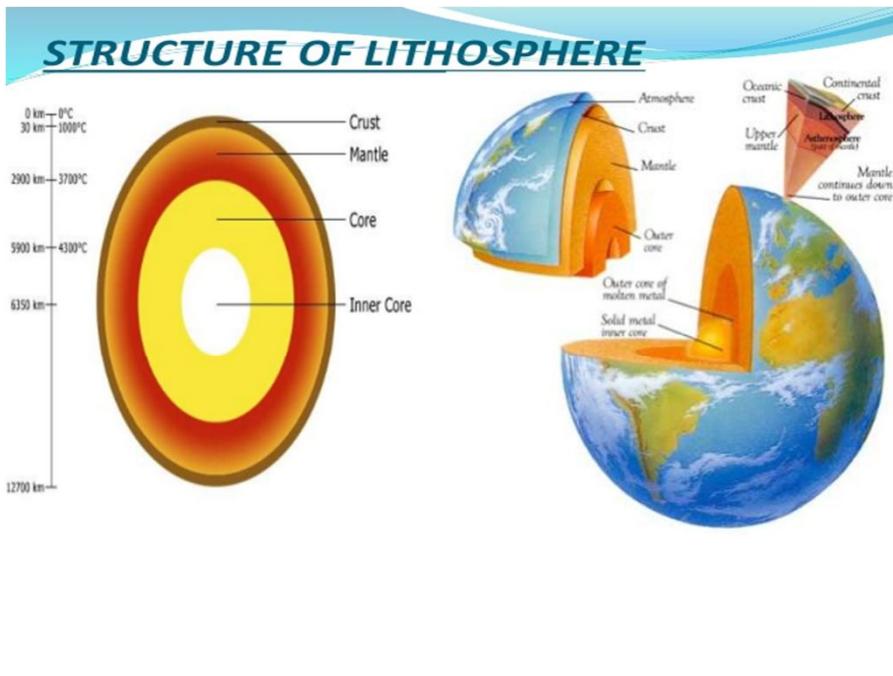
Environment is the surrounding things. It includes living things and natural forces. The environment of living things provides conditions for development and growth, also causes danger and damage.

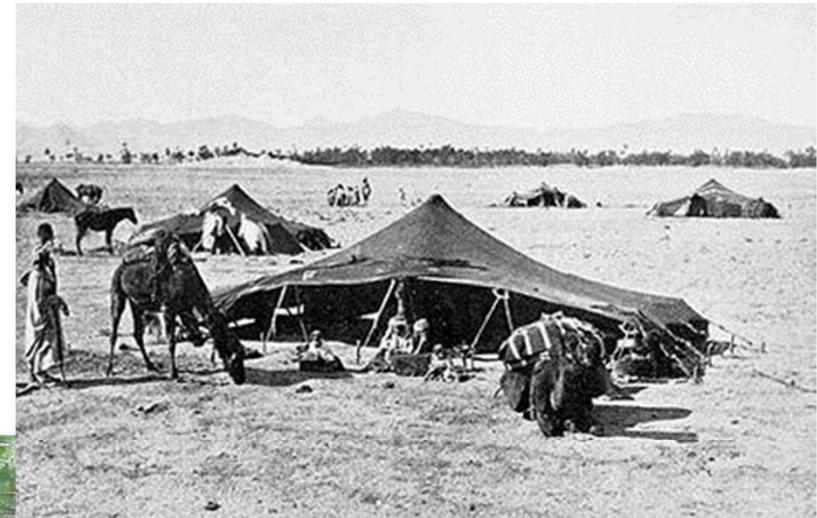


Environment consists of the interactions among plants, animals, soil, water, temperature, light, and other living and non-living things.

Types of Environment







Physical Environment:

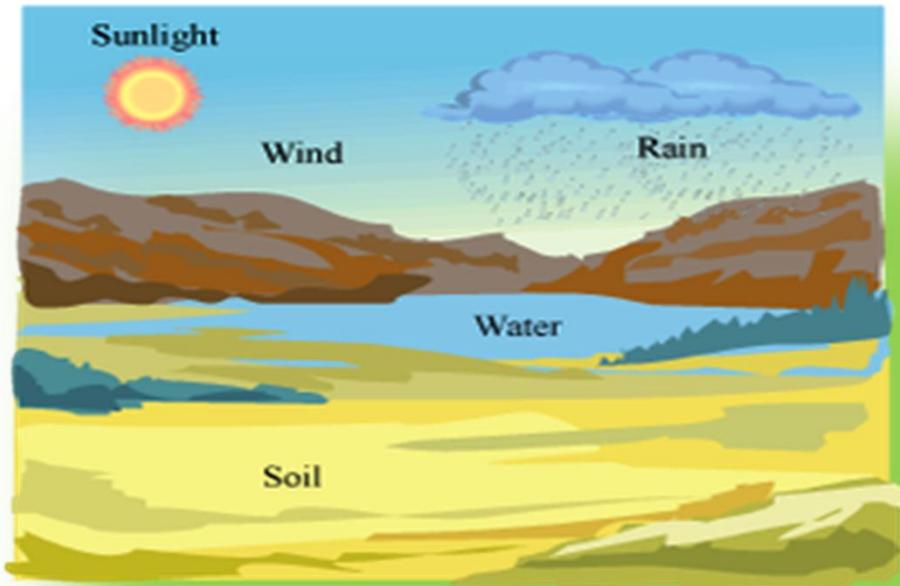
rain, humidity, temperature etc.

**Chemical
Environment:**

Organic, inorganic compounds, water acid, etc.

**Biological
Environment:**

Microbes, flora, fauna, etc.

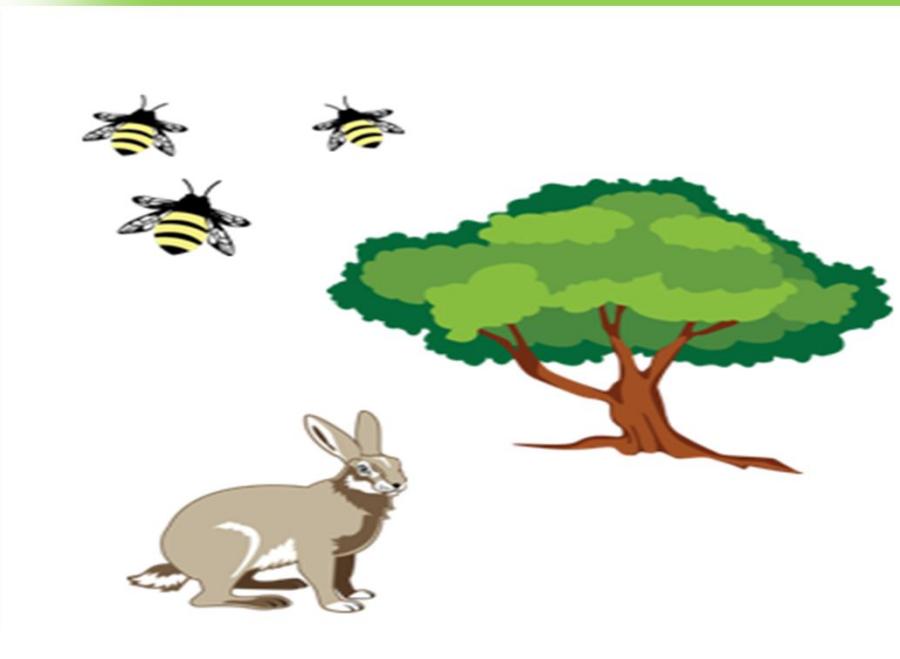


Components of Environment

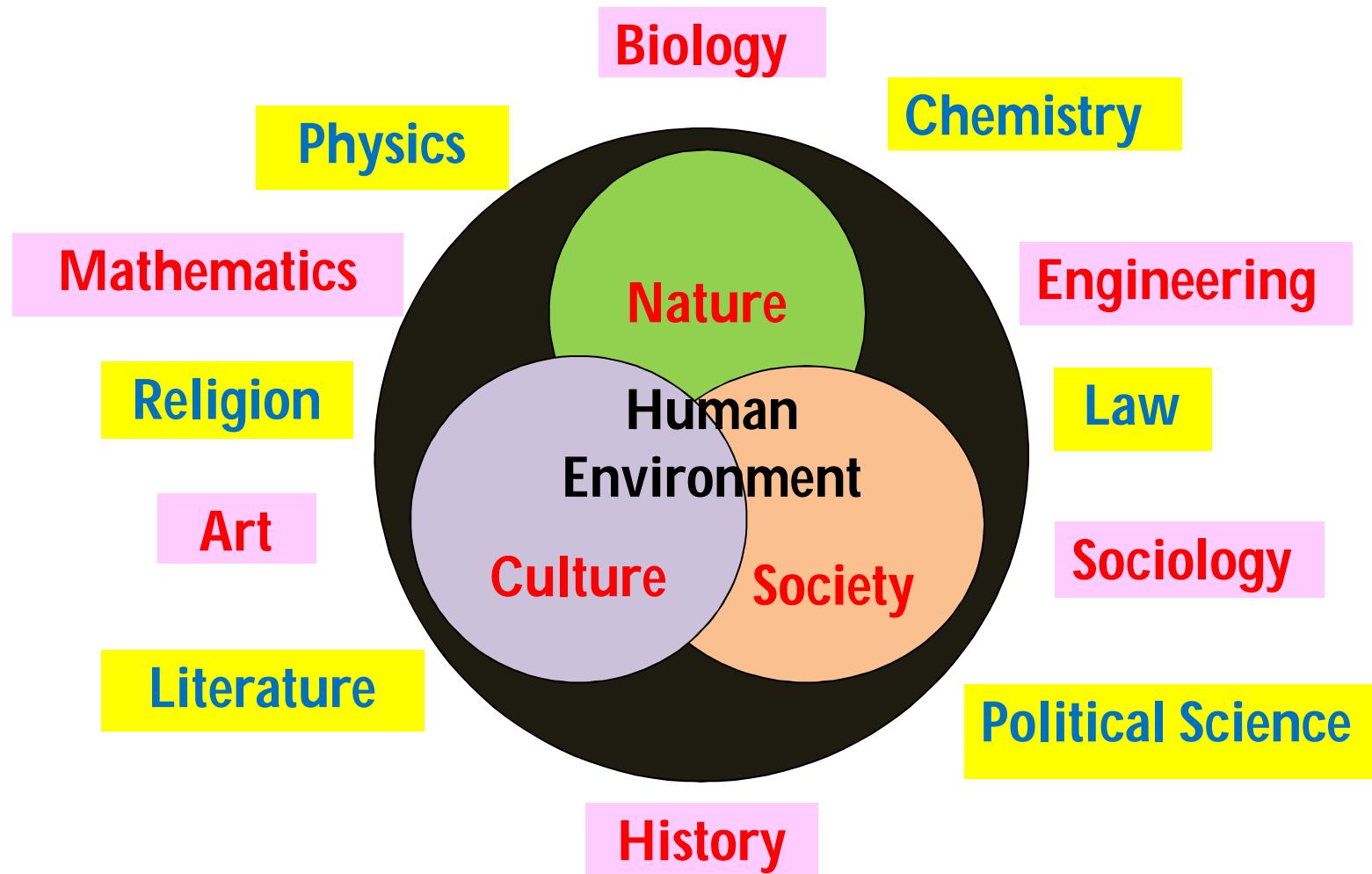
Abiotic component

Biotic component

- **Autotrophs:** Photo and chemo autotrophs
- **heterotrophs**



Multidisciplinary Involvement in Environmental Studies



Importance of Environmental Studies

- ❖ To understand current environmental problems
- ❖ Helps to maintain ecological balance
- ❖ Provides basic knowledge of environment and related issues
- ❖ Helps to achieve sustainable development & understand the relationship between development & environment
- ❖ Educate people regarding our duties
- ❖ Environmental management
- ❖ Relates environment with economy
- ❖ Aims to protect biodiversity
- ❖ Agriculture and design of sustainable products
- ❖ information related to population explosion, growth & development

Scope of Environmental Studies

- ❖ Ecosystem Structure & Function
- ❖ Natural Resource Conservation
- ❖ Environmental Pollution Control
- ❖ Environmental Management: CPCB, SPCB
- ❖ Industry
- ❖ Research & Development
- ❖ Social development: NGOs
- ❖ Environmental Journalism
- ❖ Environmentalist
- ❖ Green Advocacy
- ❖ Green Marketing

Sustainable development



Measures for sustainable development

- Implementing effective planning for population control



Using effective Technology:



“Design with Nature” Concept

Reduce, Reuse, and Recycle (3R's) Approach:



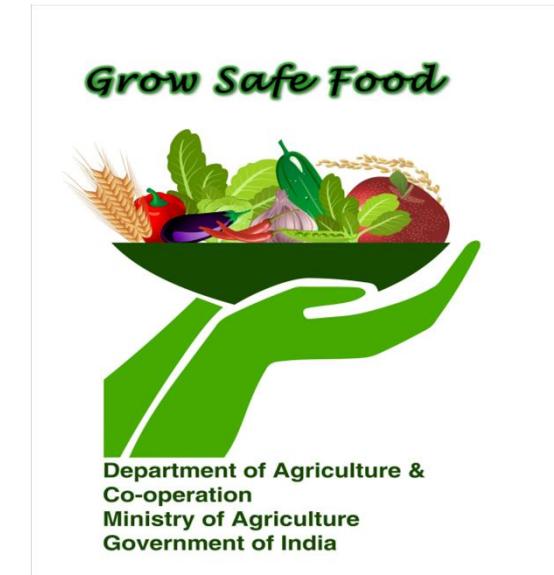
Promoting Environmental Education and Awareness:



Resource Utilization as Per Carrying Capacity



Using effective planning for regeneration of natural resources:



Problems of sustainable development

- **Disagreement between stakeholder:**
Development, economic growth and
- **Uncertainty**
- **Consumption and lifestyle**
- **Arguments over cause and responsibility:**
Pollution
- **Hunger, Poverty**
- **Automation & Unemployment**

Natural Resources

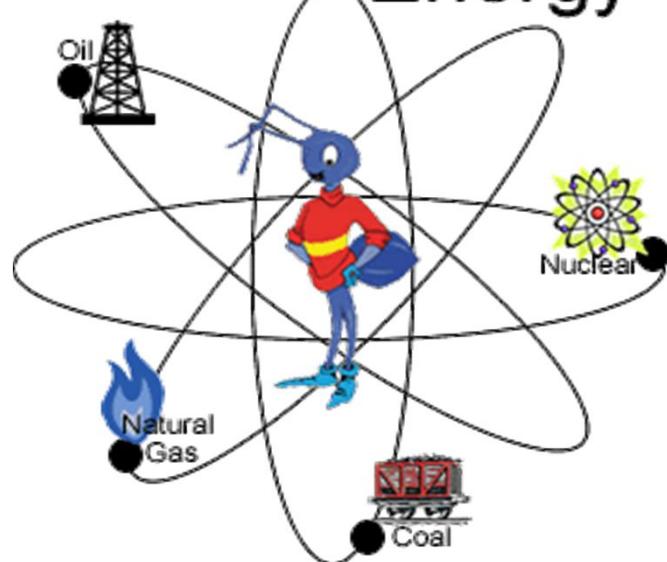


Classification of Natural Environment/Resources

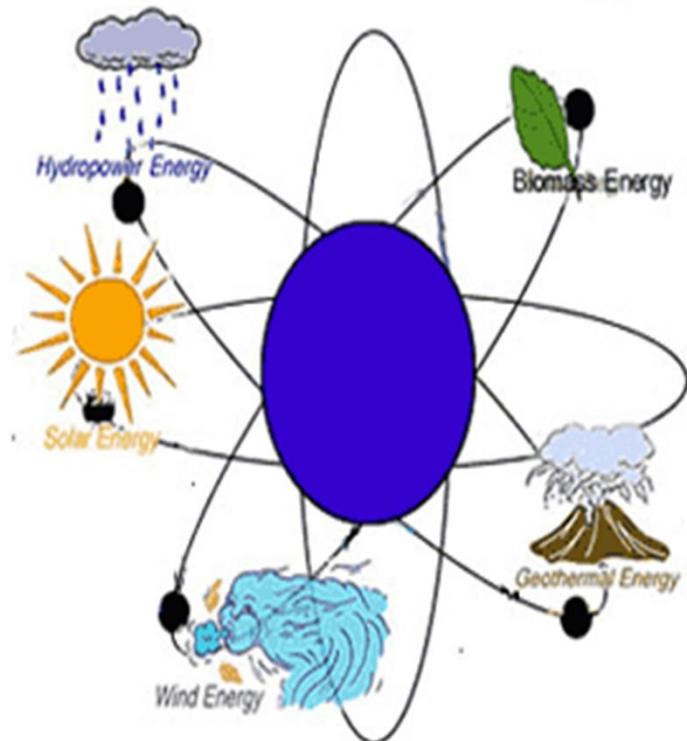
Resources

- Renewable Resources
- Non Renewable Resources

Non-Renewable Energy



Renewable Energy



Land resources



Pedology: Science dealing with land

Importance of Land as resources

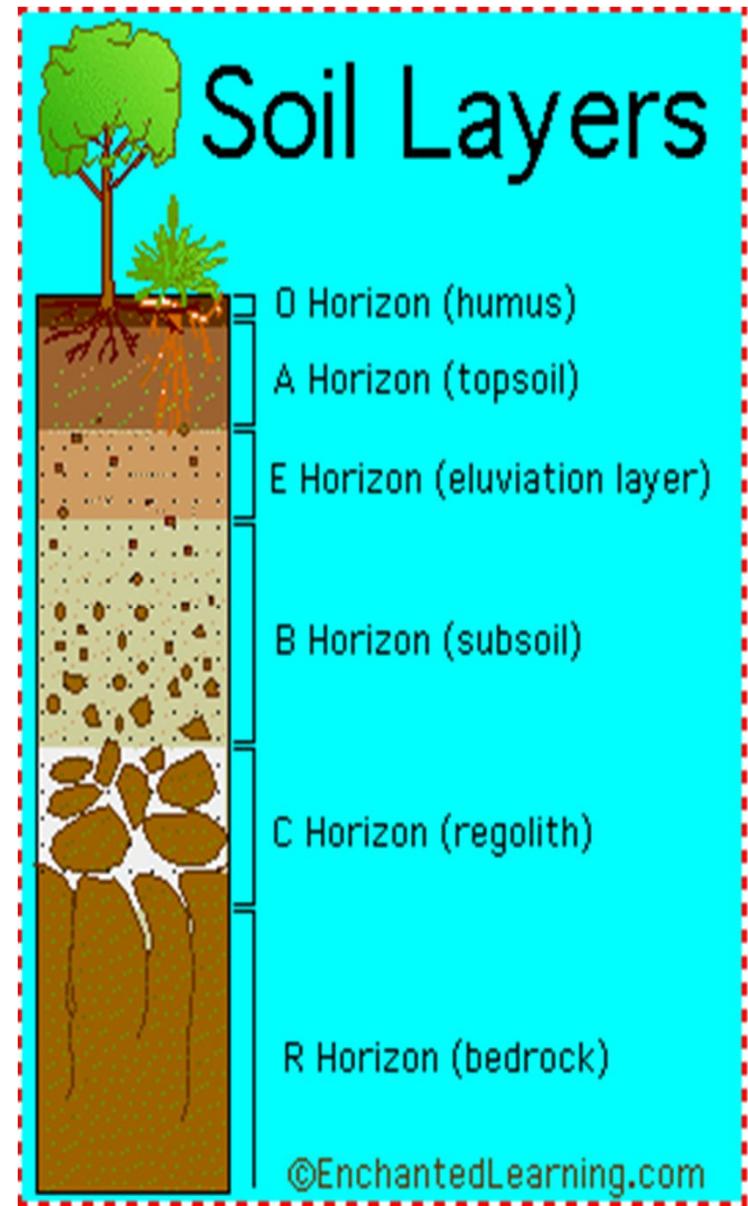
- Human civilization
- Agriculture
- Minerals
- Underground Water
- Habitat
- Daily needs

❖ Soil Formation:

❖ Soil Profile: Horizons O, A, E, B, C

❖ Function of soil:

- ❖ nutrient cycle
- ❖ agriculture
- ❖ water storage
- ❖ emission of gases
- ❖ degrade pollutant
- ❖ clay
- ❖ foundation



* **C Horizon** is also known as **saprolite**

❖ Land Degradation:

Cause: Natural factors

Heavy rain

High speed wind

Natural disasters

Expansion of deserts

Anthropogenic Factors

Mining

Urbanization

Deforestation

Overgrazing

Construction of dams

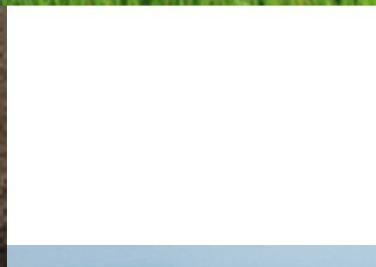
Use of fertilizers

Dumping of industrial and mining waste

❖ Soil Erosion: Causes



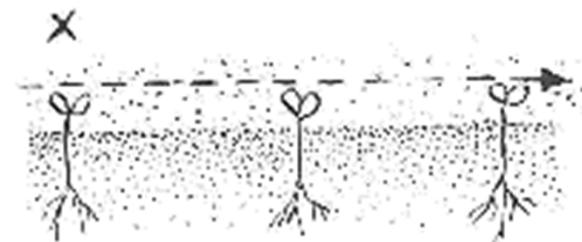
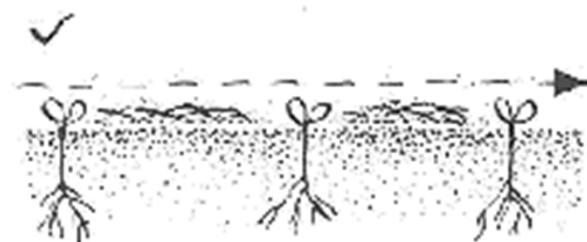
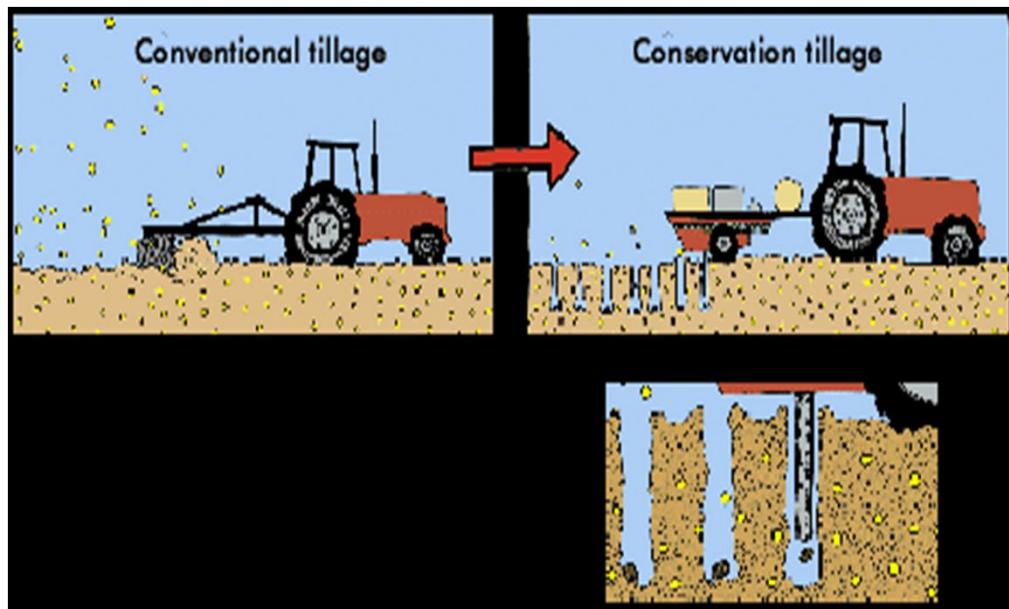
Effects of soil Erosion



Method of controlling soil Erosion

Area with mild slopes

Reduce Tillage
Stubble-mulching





Contour bunding & cultivation

Vegetative bunds

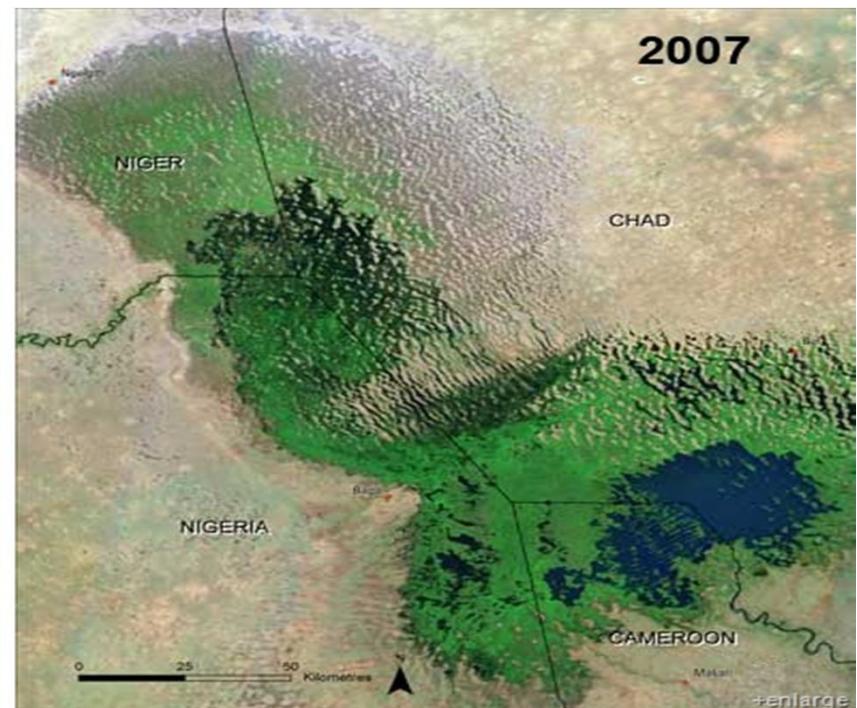
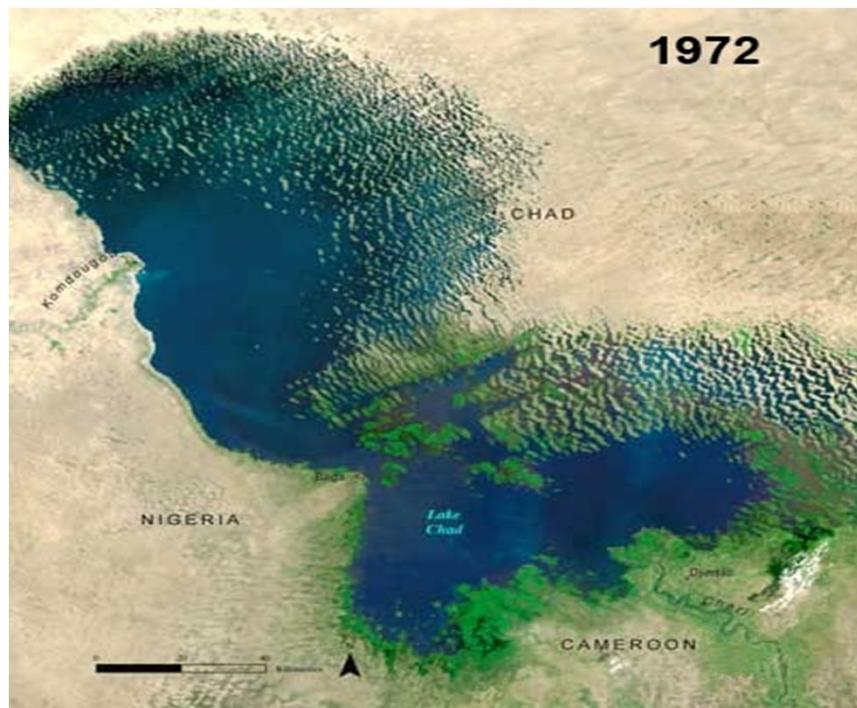


Terracing
Afforestation
Control overgrazing
Check dam
Equitable use of water sources
Preventing excavation of rocks



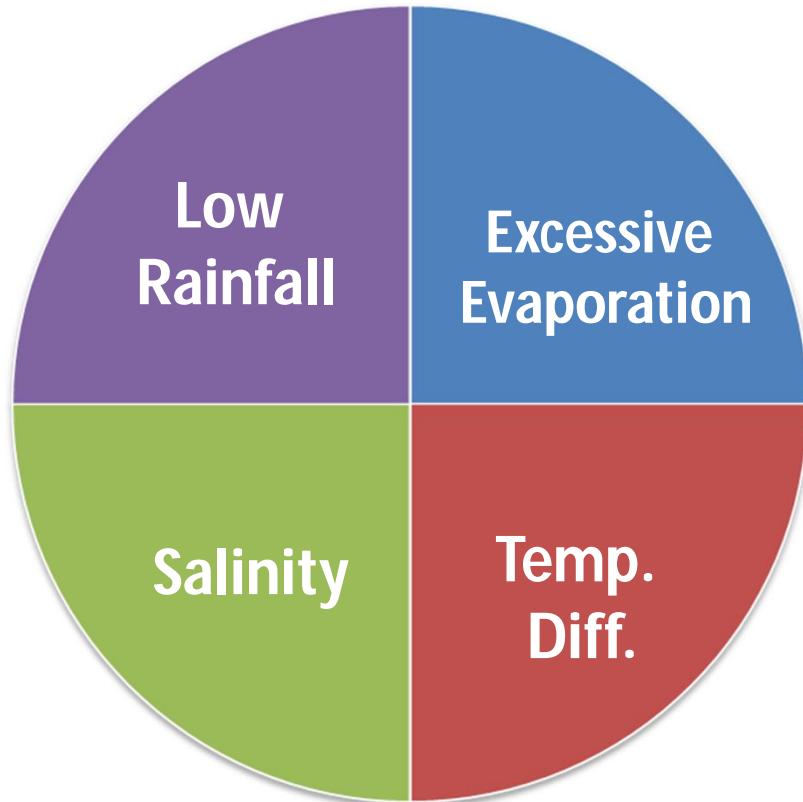
Strip cropping

Desertification

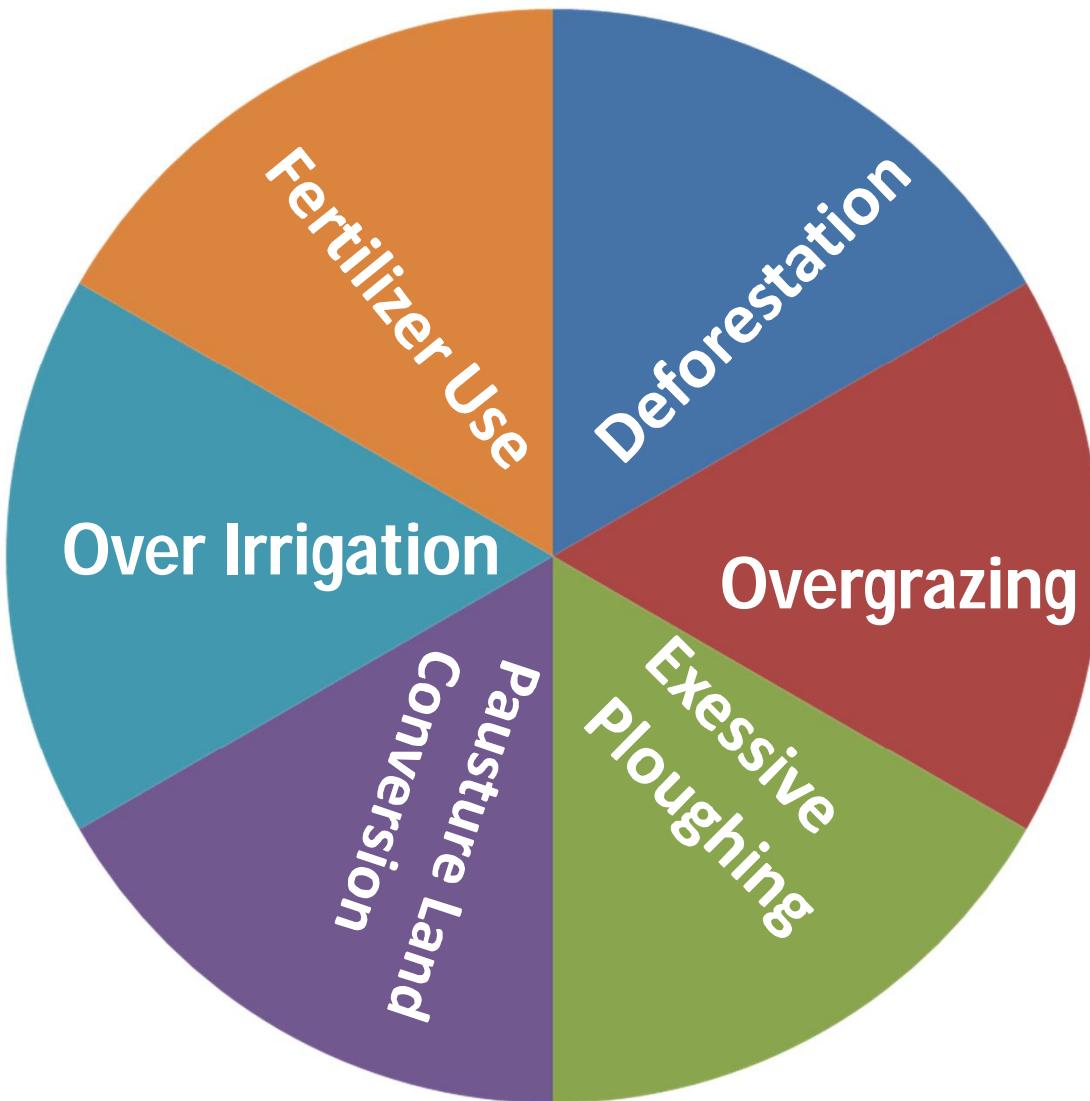


Cause:

Natural Factors:

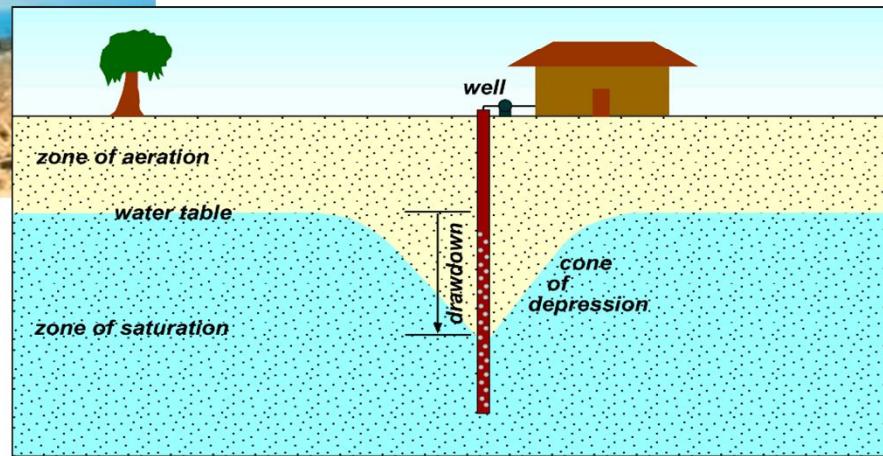


Anthropogenic Factors:

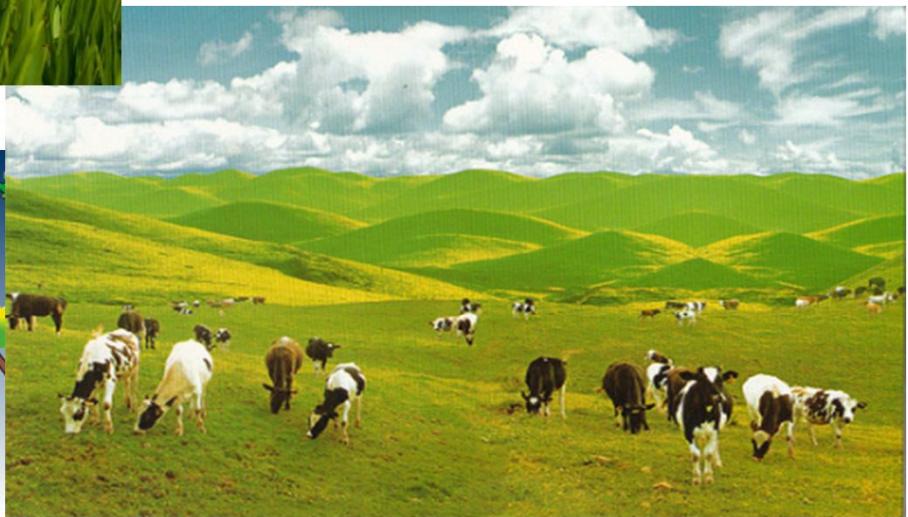
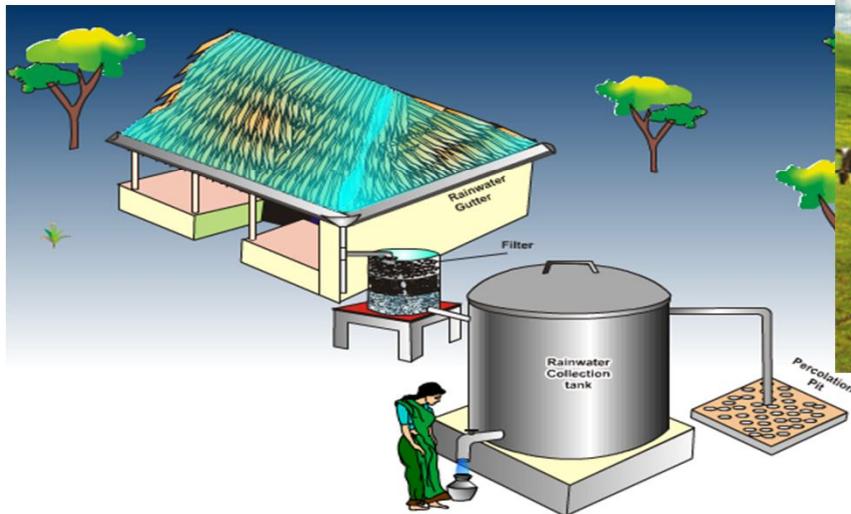




Effect:



Control:



Rainwater Collection in Thatched Roofs

A photograph of a forest scene. In the foreground, there is a dirt path covered in fallen leaves and small green plants. To the right of the path, there is a dense growth of large green ferns. The background features tall, thin evergreen trees standing in a misty, atmospheric setting.

Forest Resources:

A Renewable Resource

Introduction

- A forest is usually an area filled with trees but any tall densely packed area of vegetation may be considered a forest, even underwater vegetation such as kelp forests, or non-vegetation such as fungi and bacteria.

OR

- It is highly complex, changing environment made up of living and non living things. Living things include trees, shrubs, wildlife etc. and non-living things include water, nutrients, rocks, sunlight and air.

Forest Resources

- The word forest is derived from a Latin word “ Foris” means Outside
- Forests are the dominant terrestrial ecosystem of Earth, and are distributed across the globe.
- Forests account for 75% of the gross primary productivity of the Earth's biosphere, and contain 80% of the Earth's plant biomass
- Forests are one of the most important natural resources of the earth.
- Tree forests cover approximately 9.4 percent of the Earth's surface (or 30 percent of total land area i.e., Approximately 1/3rd of the earth's total land area).



Temperate rainforest in Tasmania's
Hellyer Gorge



Mixed deciduous forest in Stara
Planina, Serbia



A conifer forest in the Swiss Alps

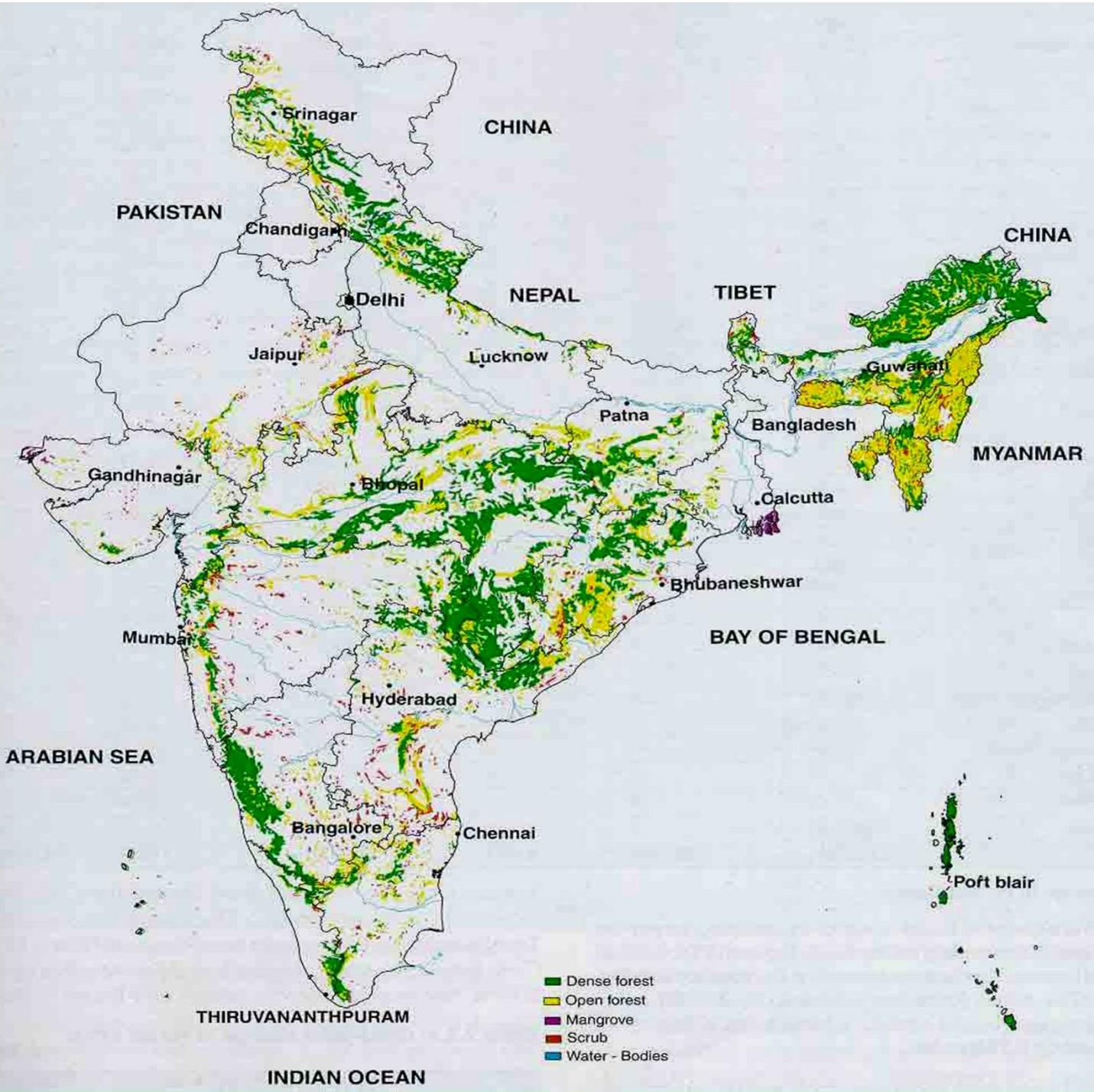


Amazon Rainforest in Brazil

Indian Scenario

- In India forest cover Overall, 21.34% of the country's geographical area is now under green cover (**as per 2009* data**) The total forest cover in India is **6,90,899 km²**.
- Forest cover in India is defined as all lands, more than one hectare in area with a tree canopy density of more than 10%.

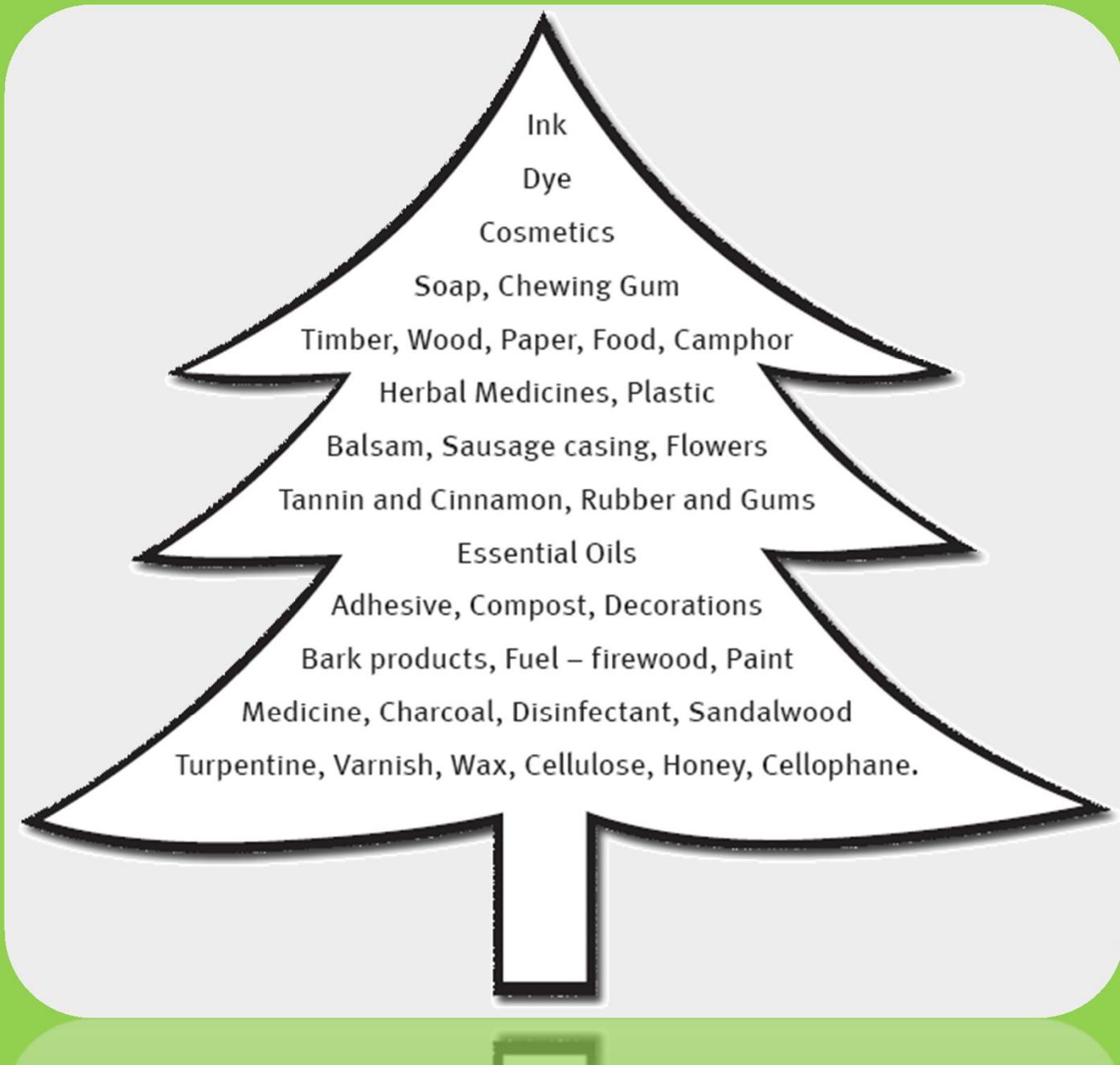
Very Dense Forest	All lands with tree cover of canopy density of 70% and above
Moderately Dense Forest	All lands with tree cover of canopy density between 40% and 70%
Open Forest	All lands with tree cover of canopy density between 10% and 40%.
Scrub	Degraded forest lands with canopy density less than 10 %.
Non-forest	Any area not included in the above classes.



State of Forests Report 2015: Key Findings

- **Total forest cover in India:** 7,01,673 sq km (**increase of 3775 sqkm**)
 - **Total forest cover as percentage of geographical area:** 21.34 per cent
 - **Increase in carbon sink:** 103 million tonnes CO₂ equivalent
- **Top five states with maximum forest cover (in km²)** are as follows:
- Madhya Pradesh (77,462)
 - Arunachal Pradesh (67,248)
 - Chhattisgarh (55,586)
 - Maharashtra (50,628)
 - Orissa (50,354)
- **Top five states/UTs with maximum forest cover as part of their area** are as follows:
- Mizoram (88.93%)
 - Lakshadweep (84.56%)
 - A&N islands (81.84%)
 - Arunachal Pradesh (80.30%)
 - Nagaland (78.21%)

Uses of forest



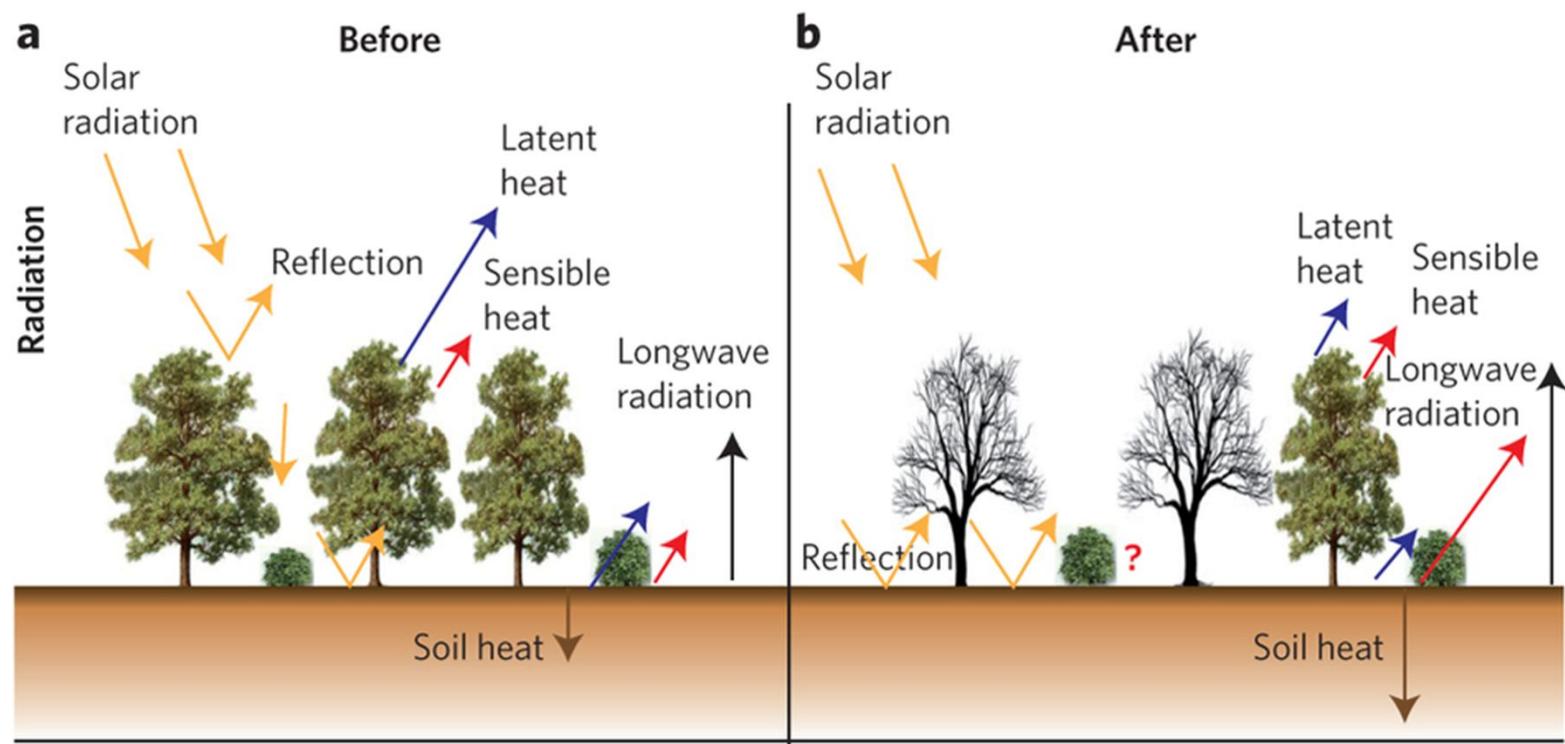
Functions of Forests

- The functions of forest may broadly classified into following categories
- ***Protective Function***
- ***Productive Function***
- ***Regulative Function***
- ***Accessory Function***

1. Protective Functions

- Forest Provide protection against
- Soil erosion
- Droughts
- Floods
- Radiations





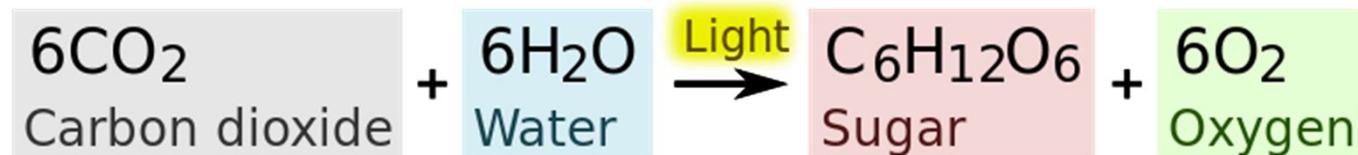
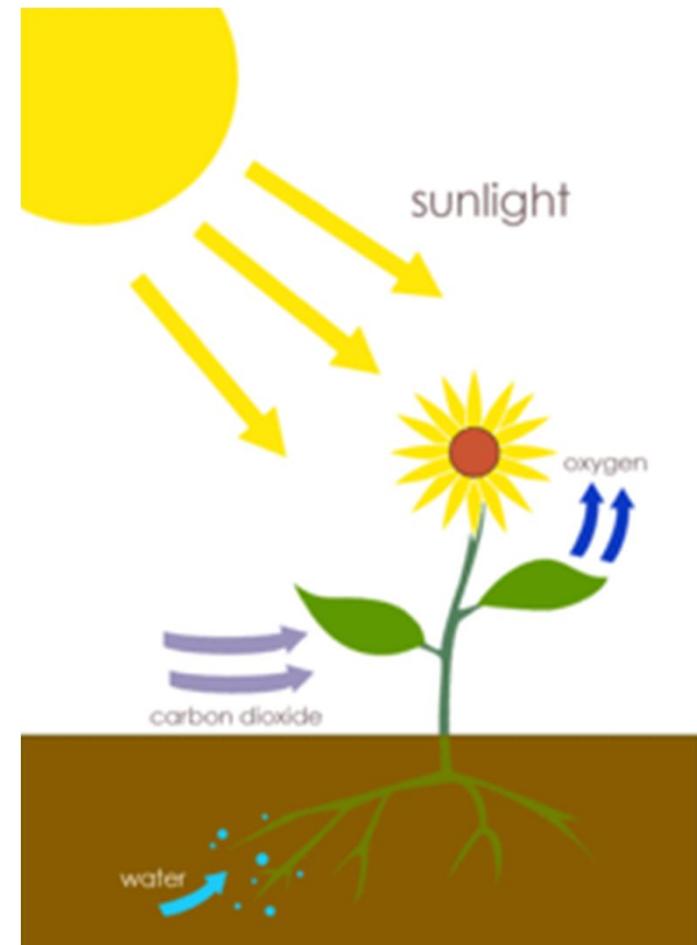
2. Productive Functions

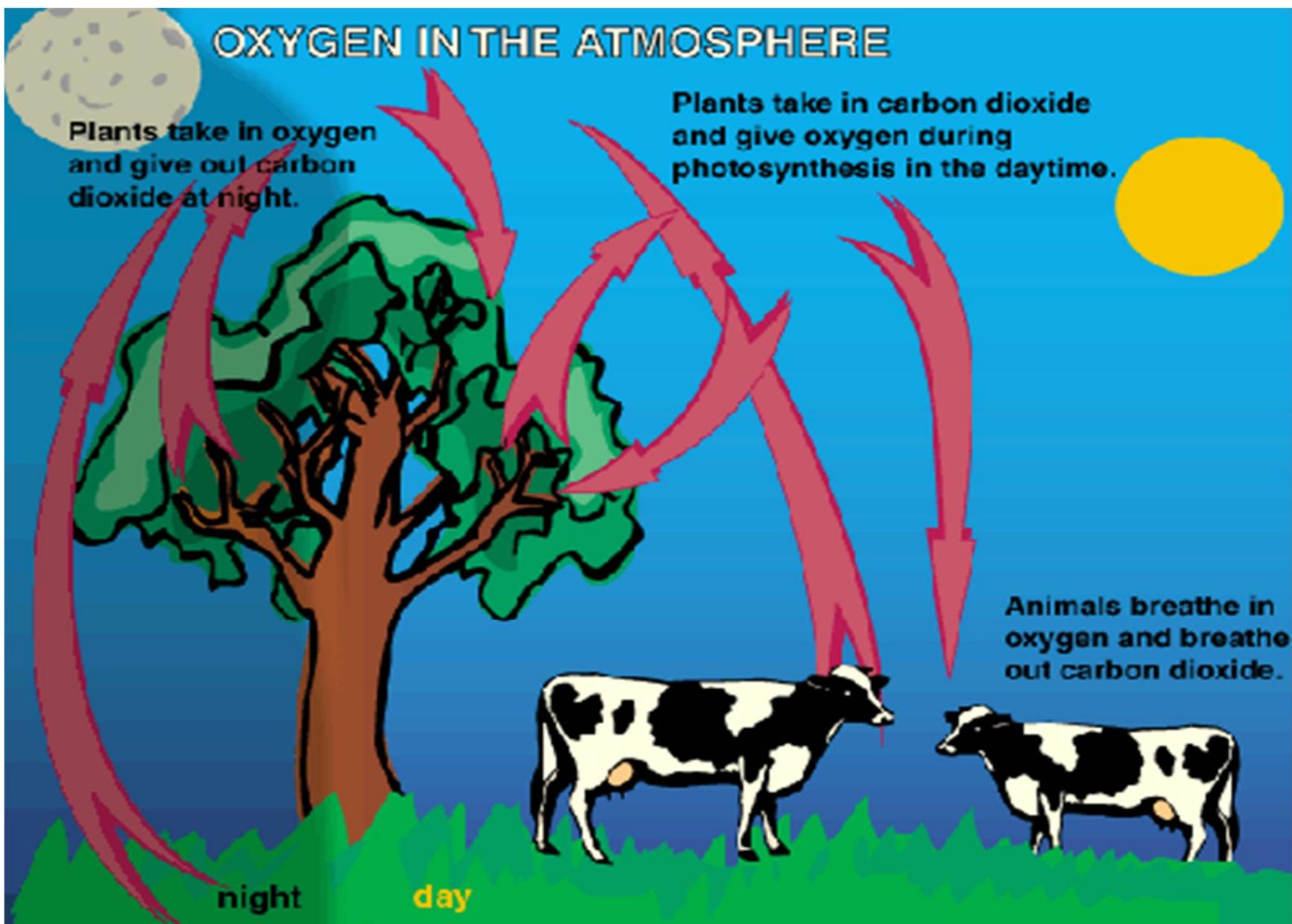
- Forest Provide various products like, gum resins, medicines, honey, pulp, bamboo, timber, Vegetables and fruits.

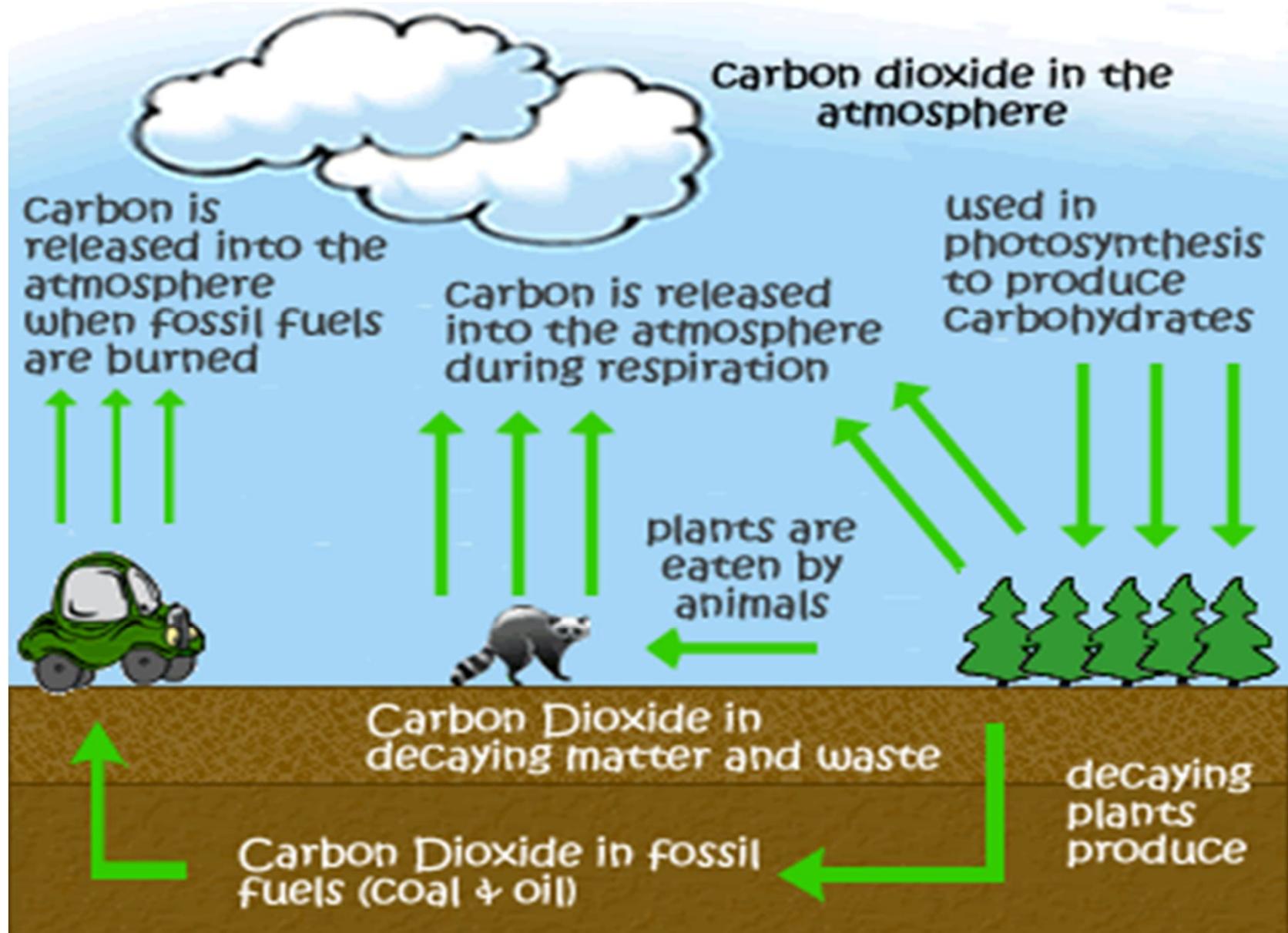


3. Regulative Functions

- The Forest **regulates the level of Oxygen and carbon dioxide in atmosphere.**
- The forests also help in regulating temperature conditions







4. Accessory Function

- Forest provides aesthetics, habitat to various flora and fauna besides that it also has an recreational value.



Importance of Forests

Direct Benefits

- Timber
- Raw material
- Edible product
- They provide natural habitat to tribal people
- Manure and fuel wood
- They are an important source of national income
- Medicinal plants
- Tourism: Ecotourism
- Employment opportunities

Indirect Benefits

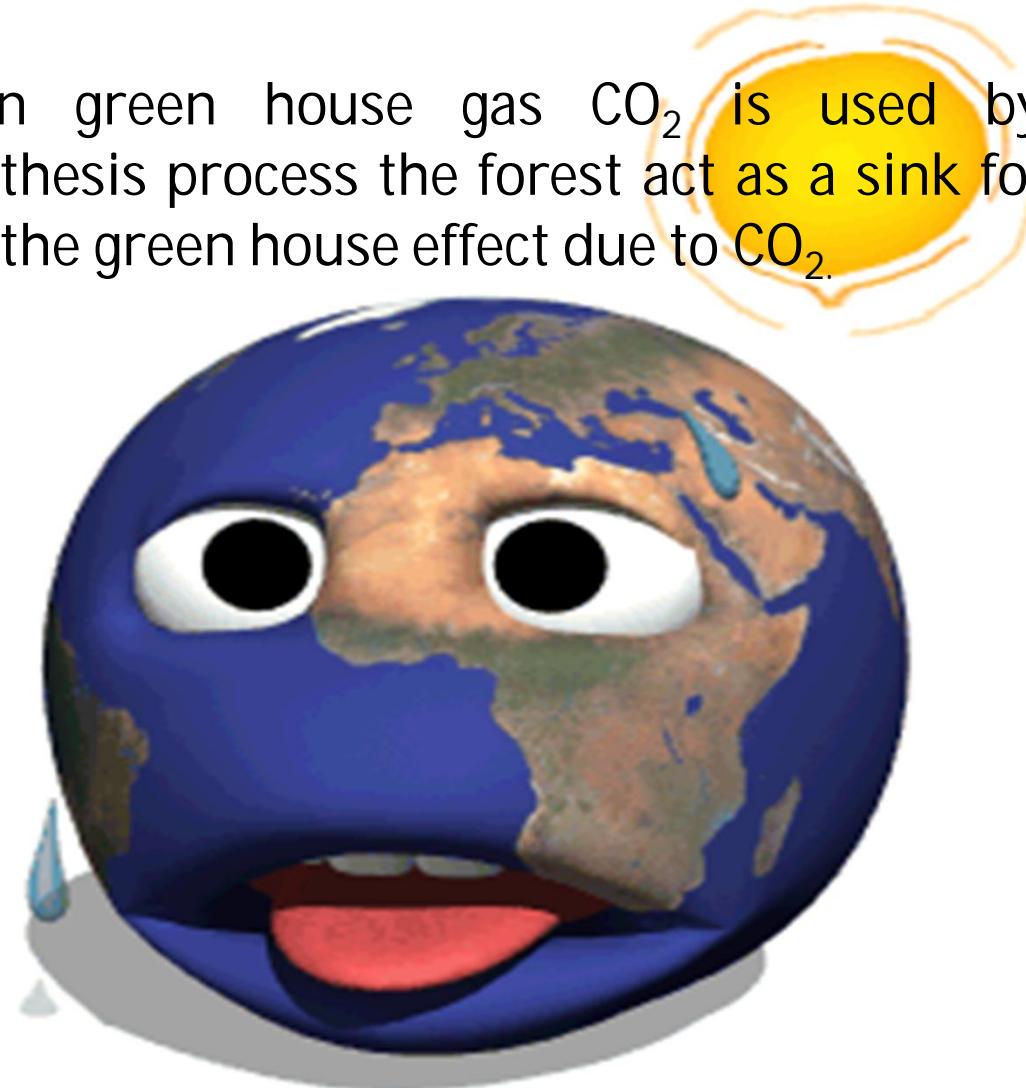
- Forests help in minimizing natural hazards (Flood, drought).
- They help in reducing soil erosion and siltation of downstream water bodies.
- They help in reducing desertification and land degradation.
- They help in maintaining biodiversity by providing habitat to wild animals.
- They help in regulating hydrological cycle.
- They help in regulating the gases in atmosphere.

Ecological Importance or uses of Forests

- ***Regulation of global climate and temperature***
 - Forest play a crucial role in regulation of global climate and temperature as forest cover absorb the solar radiations that would otherwise be reflected back into the atmosphere by bare surface of the earth.
 - Transpiration of plants increases the atmosphere humidity which affects the rainfall, cools the atmosphere and thus regulate the hydrological cycle

Reduction of Global Warming

The main green house gas CO₂ is used by forests for photosynthesis process the forest act as a sink for co₂ there by reducing the green house effect due to CO₂.



Conservation of Soil

- They prevent **soil erosion** by
- binding the soil particles tightly in their roots.
- reducing the velocity of wind and rain which are chief agents causing erosion



Absorption of air pollutants

- Forest absorbs many toxic gasses and air pollutants and can help in keeping air pure.



Economical Importance of Forest

- ***Timber***: Wood used for commercial purposes like for making furniture and other items like boats, bridges and other day to day uses.
- ***Fuel Wood***: The wood is used as fuel for cooking and other purposes by poor people.
- ***Raw material for wood based industries***: forest provide raw material for various wood based industries like paper and pulp, sports goods, furniture, match boxes etc.



- ***Food:*** Fruits, roots, leaves of plants and trees along with the meat of forest animals provide the food to the tribal people.
- ***Miscellaneous Products:*** Miscellaneous products like, resin, gums, oils, medicines, honey are provided by forests



Over-exploitation of Forests

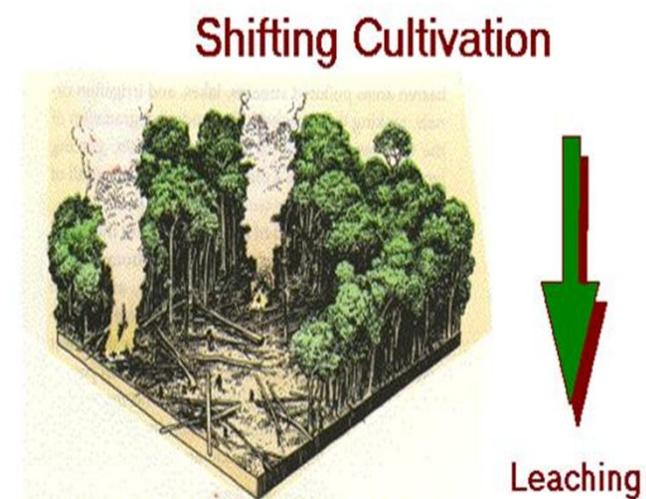
Deforestation

- The permanent destruction of forest is called deforestation
- Forest are exploited since early times for humans to meet human demand



Causes of Deforestation

- *Forest land for Agri. Use*
- *Expansion of cities*
- *Construction of dams, canal & highways*
- *Establishment of industrial areas*
- *Demand for firewood*
- *Mining*
- *Shifting Cultivation*
- *Forest fire*
- *River valley projects*



- *Growing food demand*
- *Fire wood*
- *Raw material for wood based industry*
- *Infrastructure development*
- *Over grazing*
- *Natural forces*



'Food for Thought'



Effects of Deforestation

- *Loss of habitat*
- *Inc. intensity and frequency of flood*
- *Land degradation*
- *Loss of forest products*
- *Change in climatic condition*
- *Siltation of rivers and lakes*
- *Loss of revenue*
- *Change in water cycle*
- *Reduced rainfall*
- *Soil erosion*
- *Expansion of deserts*



Afforestation

“conversion of bare or cultivated land into forest”

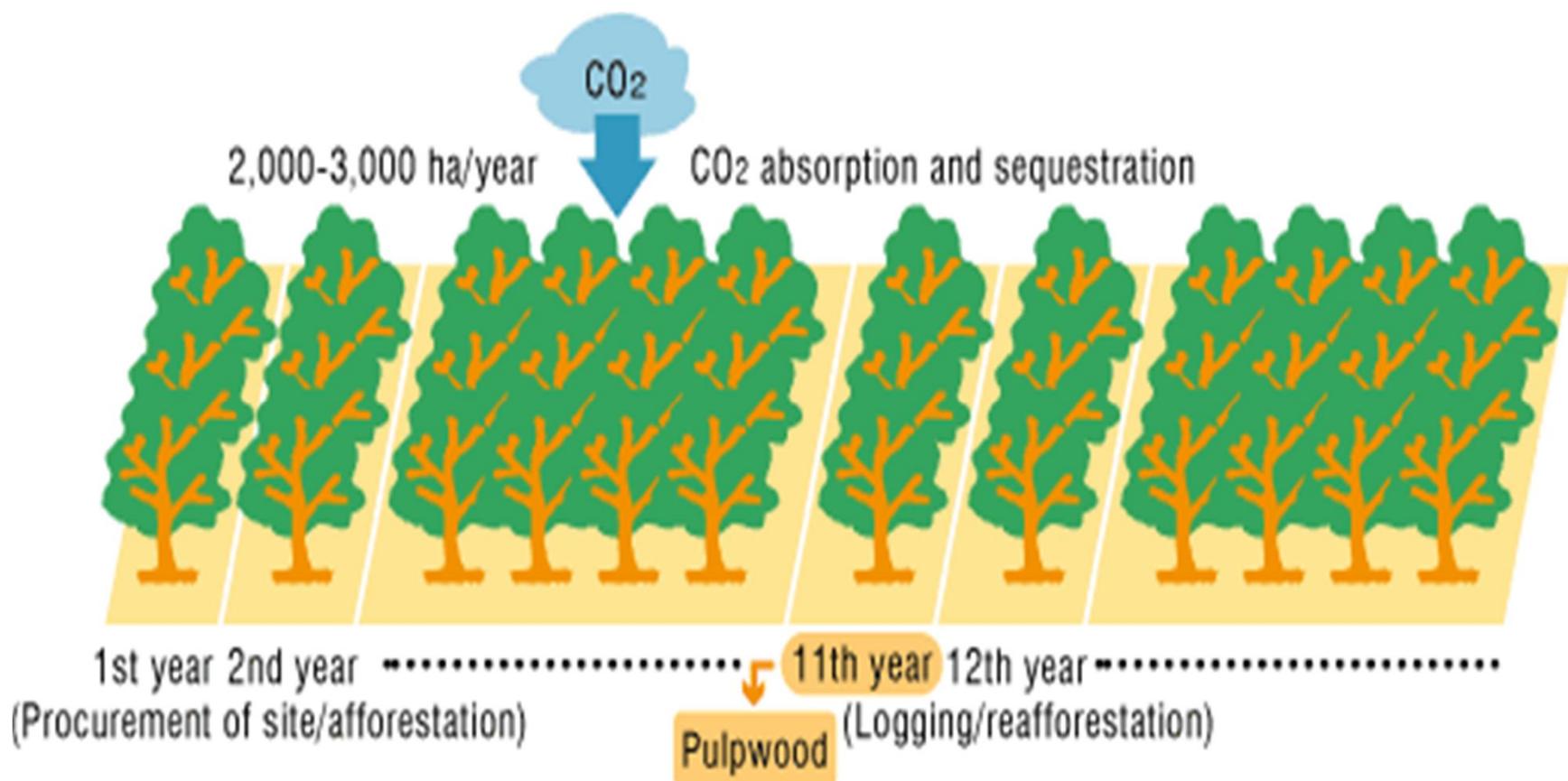


Afforestation

- The conservation measure against the deforestation is afforestation. The development of forest by planting trees on waste land is called afforestation
- The main objective of afforestation:
 - To control the deforestation
 - To prevent soil erosion
 - To regulate rainfall and maintain temperature



- To control atmospheric condition by keeping it clean
- To promote planned uses of wasteland
- To Protect forest ecosystem and to get benefits of forest products.



Dams and their effects on Forest and Tribal People

- When a dam is constructed across any river a huge artificial lake is developed in the catchment area of that dam. It is also known as **back waters**. The backwaters covering a large surface area. Create a lot of ill-effects on the living environment. They are as follows:



- It creates the loss of forest which are submerged under the back waters of the dam.
- It creates danger to the habitat of the wild life. The wild life are forced to migrate.
- It also affects the land under cultivation, in the catchment area as the crops get submerged under water.
- The roads, already in existence are put under water after the construction of dam. So the road network is damaged.



Please, Help Reduce Global Warming!



PLANT A TREE NOW!

Thank You

Water Resources



Properties of Water

- Prerequisite for existence of life
- Cannot be substituted by anything else
- Can be recycled and reused
- Needed for economic growth, environmental stability, biodiversity conservation, food security and health care
- Plenty of water on earth, but many millions face water scarcity.
- Global water cycle provides us with fresh water every year.

Importance of Water

- Water is the **basic component** of every living **cell**.
- Water moves through different biotic and abiotic component-hydrological cycle
- **Industries** consumes water for cooling, heating, washing etc.
- It is the basic input required for **agriculture**.
- Hydrothermal power can be used for generating **hydroelectricity**.
- It provides **habitat** to aquatic flora and fauna.
- Common salt can be obtained from water.
- We need water to grow plants, care for animals, cook food, bath, brush our teeth, flush the toilet, and wash our clothes etc.



Why do we need to save water?

- Most of the Earth's surface is covered by water.
- You might think that there is plenty of water for everyone to use. But did you know that most of the water on the Earth is ocean water?
- Ocean water is very salty. You can't drink it, use it for growing plants, cooking food, bathing, or washing clothes.
- It is estimated that **15% of worldwide water use is for household purposes**. These include drinking water, bathing, cooking, sanitation, and gardening.
- The water we use for these things is called freshwater. It comes from rain or snow that falls in rivers and lakes. It is also found in rocks beneath the ground.



Sources of Fresh water

1. Surface water

2. Frozen water

3. Ground water

4. Rain water

•Surface water:

Surface water is water in a **river, lake, ponds or fresh water wetland**. Surface water is naturally replenished by precipitation and naturally lost through discharge to the oceans, evaporation, and sub-surface seepage.



Ground Water:

Sub-surface water, or groundwater, is fresh water located in the pore space of soil and rocks. It is also water that is flowing within aquifers below the water table.



Desalination:

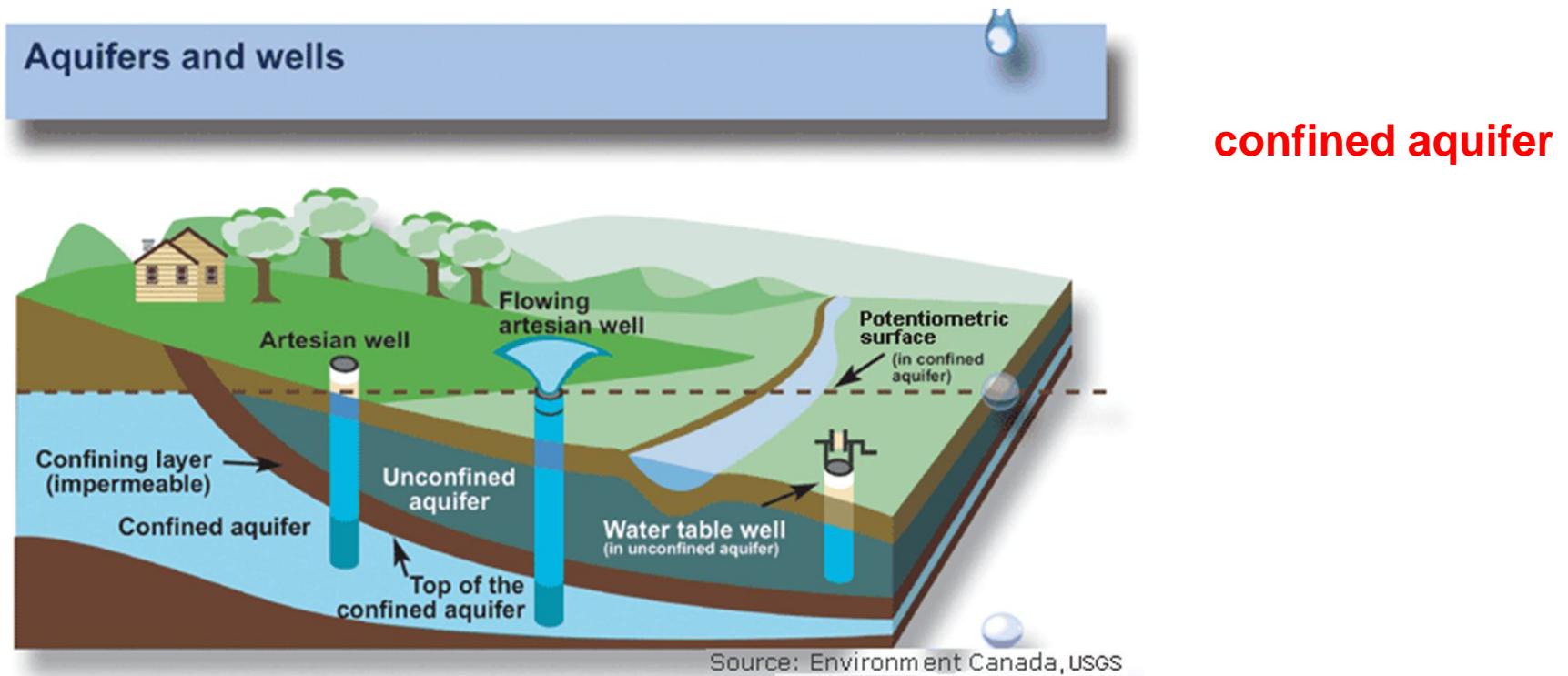
Desalination is an artificial process by which saline water (generally sea water) is converted to fresh water.



Frozen Water:

Several schemes have been proposed to make use of **icebergs** as a water source, however to date this has only been done for novelty purposes. **Glacier** runoff is considered to be surface water.

Under River flow

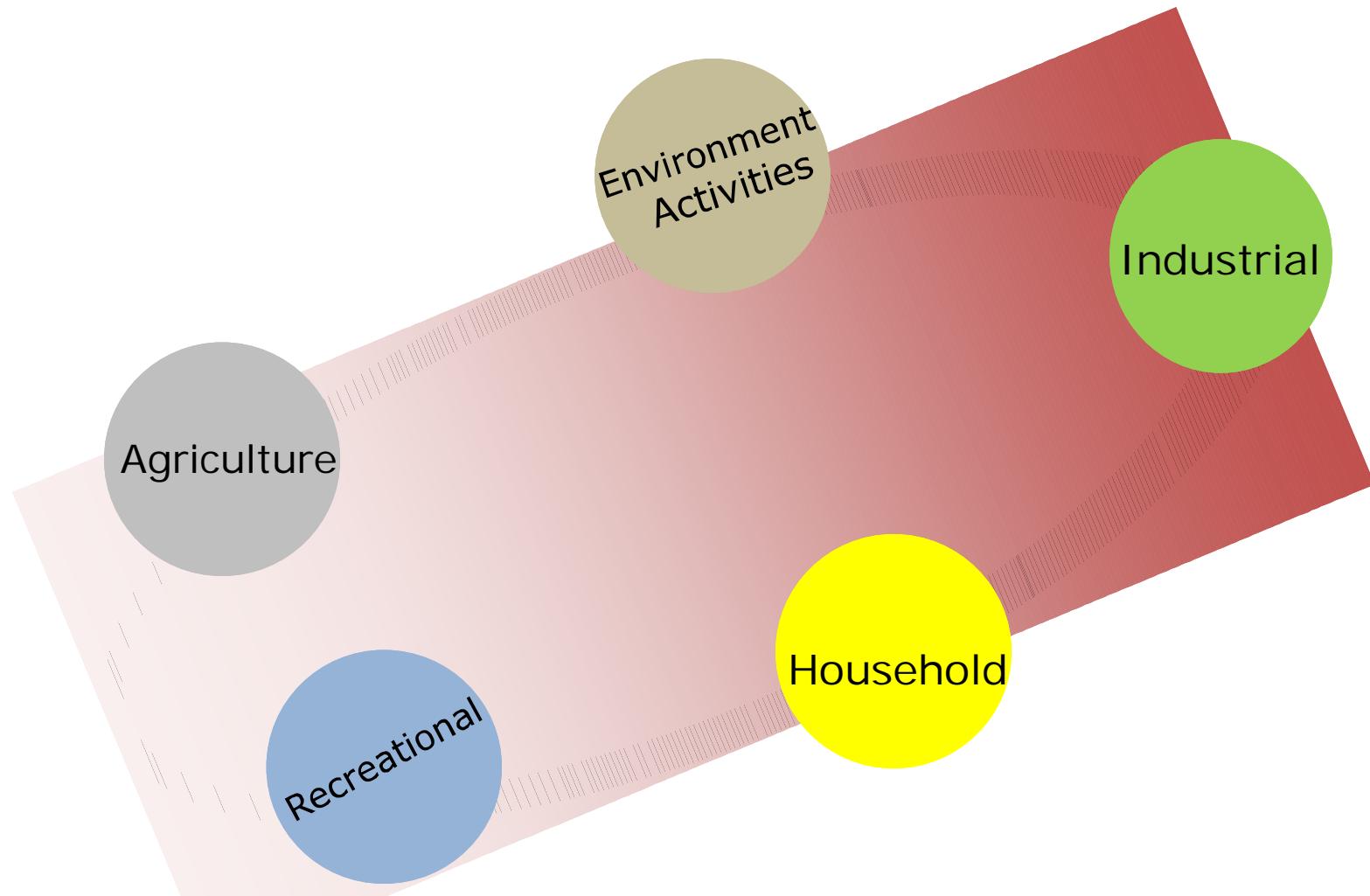


Uses Of Water

Productive use (Irrigation)

Consumptive use (drinking, cooking etc.)

Commercial use (fountains, industries etc.)



How do people use Water Resources?

Divide

Household

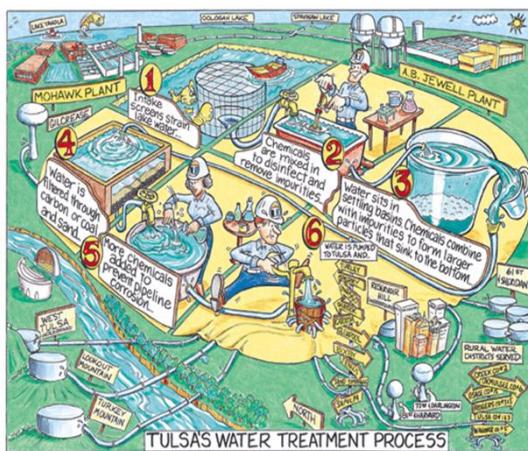
- Washing dishes
- Fill the car with water
- Watering the plants
- Putting out the fire
- Give water for the cows
- Watering the grass
- Washing the car

Personal Use

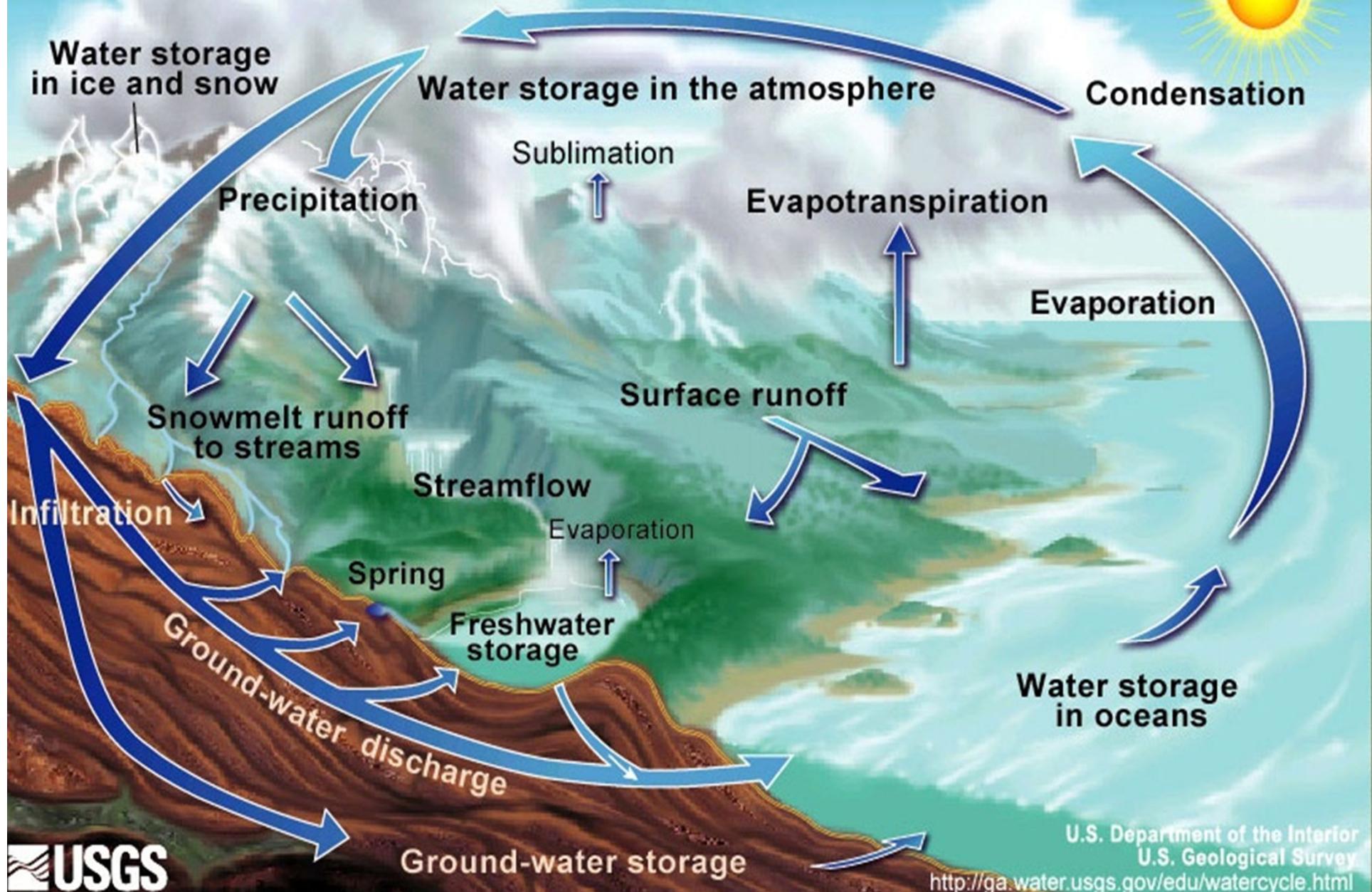
- Washing the teeth
- Drinking water
- Take a shower
- Going to the bathroom
- Walk in the pool for recovering health

Recreational activities

- Go to the pool.
- Go to the beach.
- Walk in the pool for recovering health.
- Skiing in the mountains.
- Fish in the lakes.
- Play with a ball in the river.
- Surfeit in the ocean.



The Water Cycle



Water Crisis/ Calamities: Floods and Droughts

Floods

Floods refers to the **presence of unusually large amount of water at any place** or more water that can be handled by the drainage of the area. It depends on climate , nature of the collecting basins, Streams, soil, vegetative cover, amount of snow melt and rainfall. The various types of floods are

1. Flash Floods: caused suddenly due to heavy rainfall

2. River floods

3. Coastal Floods



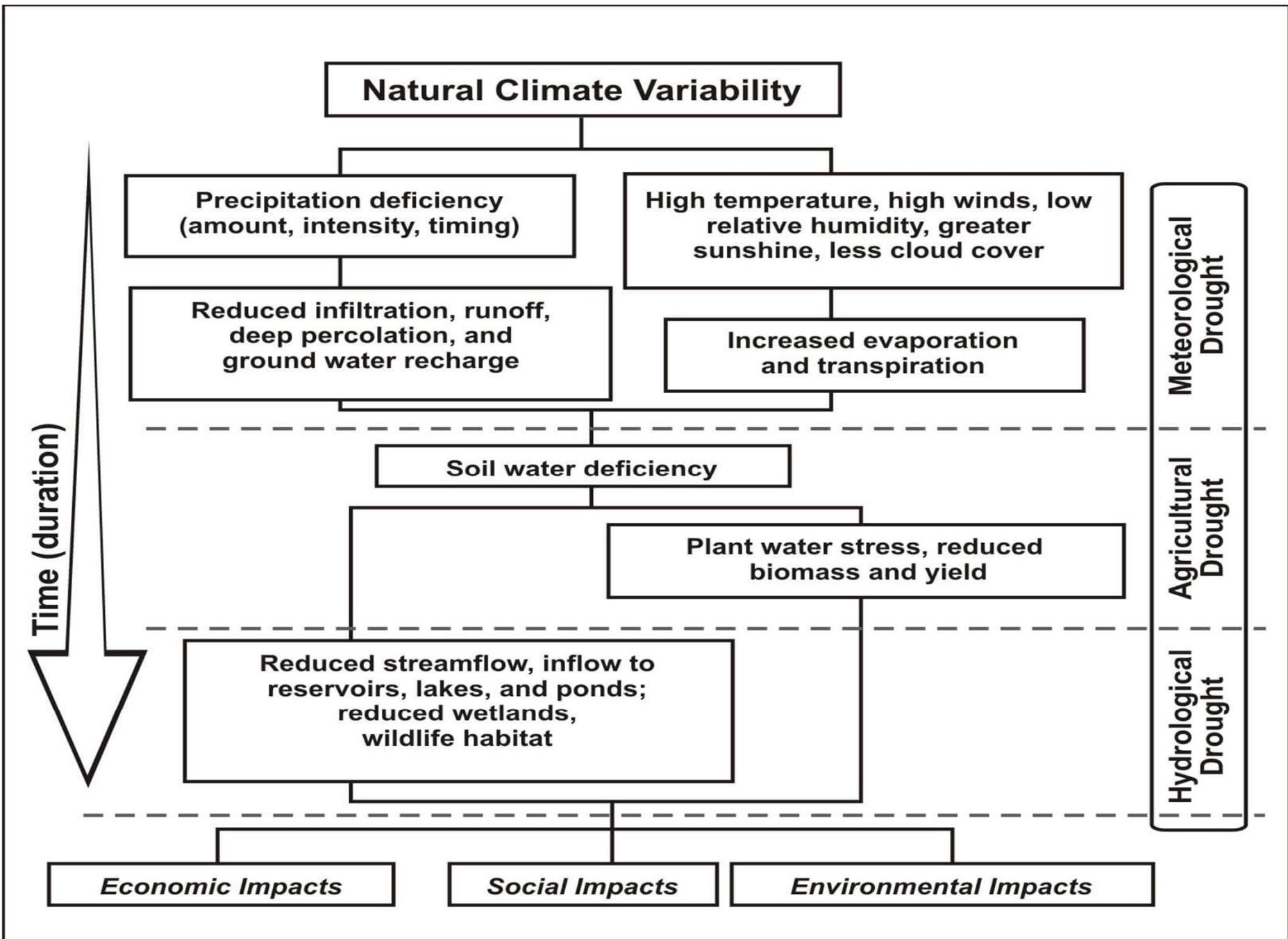
Drought

A drought is a condition in which **a region suffers from a severe scarcity in its water availability**. Mainly due to constantly below average rain fall. Effects ecosystem and agriculture

The various kinds of drought are

1. Meteorological Drought
2. Hydrological Drought
3. Agricultural Drought





Dams: Benefit and Problems

Large reservoir of Water, in which the water of the river is blocked by constructing a strong wall of iron and concrete, and size and height of dams depend on the catchment area



Dams: Benefits and Problems

Advantages of Dams

- Irrigation
- Production of electricity
- Recreation (Beautiful landscape)
- Control of floods
- Increase in the availability of water for domestic as well as industrial purposes

Disadvantages of Dams

- Deforestation and loss of biodiversity
- Sinking of agricultural and forest land
- Displacement of tribal people from their homes
- Unchecked growth of aquatic weeds
- Siltation of reservoirs due to degraded catchments conditions
- Change in microclimate
- Increase in water-borne and soil-borne diseases
- Increase in flash floods
- Increase in frequency of earthquakes
- Increase in water logging and salinity
- Changes in Earth's rotation
- Emission of greenhouse gases

Solutions to Water Crisis

- Reduce demand:
 - Adopt agriculture practices that require less water:
 - Reduce industrial consumption through recycling, reuse and new water-efficient technologies.
 - Catch the rain where it falls
 - Retain water on land as long as possible through check dams and contour bunds allowing it to percolate into the ground.
 - Implement rain water harvesting in urban and rural areas
 - Restore traditional system of ponds and lakes.
 - Adopt fairer policies

Conflicts over Water

- **Nile Water Conflict:** Egypt vs. Ethiopia,
- **Brahmaputra Water Conflict:** China, India, Bangladesh etc.
- **Indus river conflict:** India & Pakistan.
- **Inter-state disputes** (e.g., Tamil Nadu and Karnataka over Caveri water)
- **Industries vs. Communities** (Coca-Cola Beverage company in Kerala.)

Water harvesting

Water harvesting is collecting and storing rain water for future use.

The common methods of water harvesting are :-

- i) Digging pits, ponds, lakes etc.
- ii) Building small earthen dams or concrete check dam.
- iv) Construction of reservoirs.
- v) Construction of rooftop collecting units in houses.

Advantages of underground water :-

- i) It does not evaporate easily.
- ii) It spreads out and recharges wells.
- iii) It provides moisture for irrigation of crops.
- iv) It does not get polluted easily.
- v) It does not provide breeding ground for mosquitoes and houseflies.

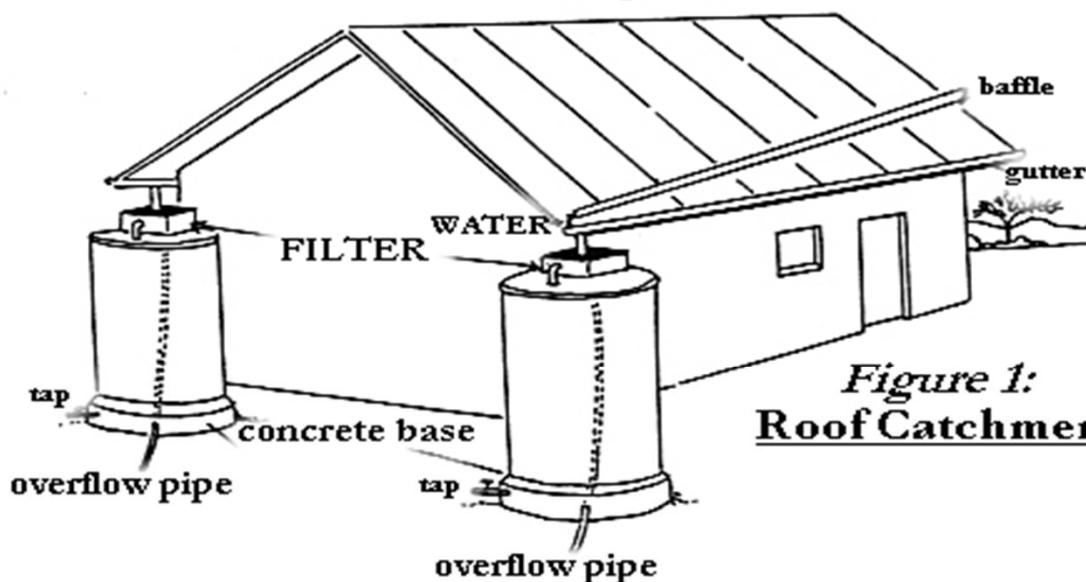
Different methods of water harvesting



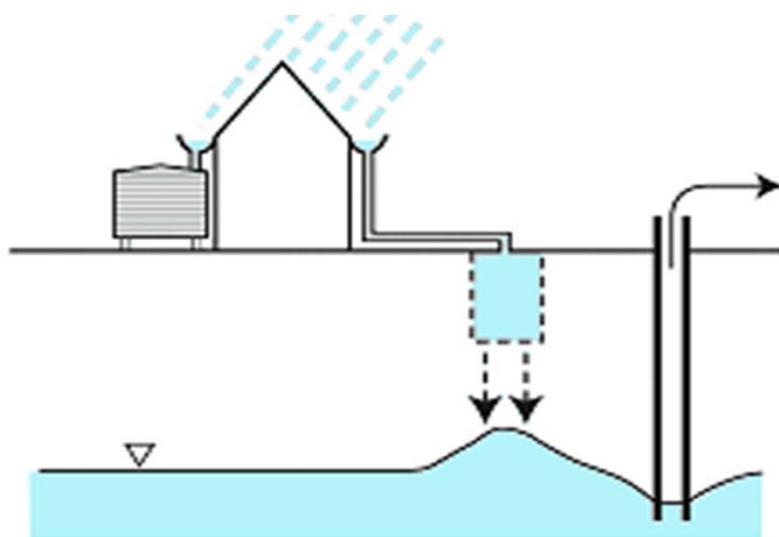
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RAINWATER HARVESTING

Metal, tile, or plastic roof



*Figure 1:
Roof Catchment*



Rainwater Harvesting

