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**Natural Resources:** Introduction, Classification.

***Water Resources;*** Availability, sources and Quality Aspects, Water Borne and Water Induced Diseases, Fluoride and Arsenic Problems in Drinking Water.

***Mineral Resources;*** Material Cycles; Carbon, Nitrogen and Sulfur cycles.

***Energy Resources;*** Conventional and Non conventional Sources of Energy.

***Forest Resources;*** Availability, Depletion of Forests, Environment impact of forest depletion on society.

# UNIT 2

## Natural Resources

- Natural resources occur naturally within environments that exist relatively undisturbed by humanity, in a natural form.
- Natural resources are derived from the environment.
- Some of them are essential for our survival, while most are used for satisfying our wants.

# Conserving Natural Resources

- Resources are features of environment that are important and value of to human in one form or the other. However, the advancement of modern civilization has had a great impact on our planet's natural resources.
- So, conserving natural resources is very essential today. There are many ways that one can conserve natural resources.

# Conserving Natural Resources

- All we need to do is to look around and see what natural resources we are using and find out ways to limit their usage.
- **4'R' principle** is quite significant in the conservation of natural resources- ie Refuse (avoid or say NO), Reduce (no wastage), Reuse and Recycle. This may/should be applied to all types of resources.

# **Classification of Natural Resources**

- **Renewable Resources** – Renewable resources can be replenished naturally. Some of these resources, like sunlight, air, wind, etc., are continuously available and their quantity is not noticeably affected by human consumption.
- Though many renewable resources do not have such a rapid recovery rate, these resources are susceptible to depletion by over-use.
- Resources from a human use perspective are classified as renewable only so long as the rate of replenishment/recovery exceeds that of the rate of consumption.

# Non-Renewable Resources

- Non-renewable resources either form slowly or do not naturally form in the environment. Minerals are the most common resource included in this category.
- By the human perspective, resources are non-renewable when their rate of consumption exceeds the rate of replenishment/recovery; a good example of this are fossil fuels, which are in this category because their rate of formation is extremely slow (potentially millions of years), meaning they are considered non-renewable.

# **Non-Renewable Resources**

- Some resources actually naturally deplete in amount without human interference, the most notable of these being radio-active elements such as uranium, which naturally decay into heavy metals. Of these, the metallic minerals can be re-used by recycling them, but coal and petroleum cannot be recycled.

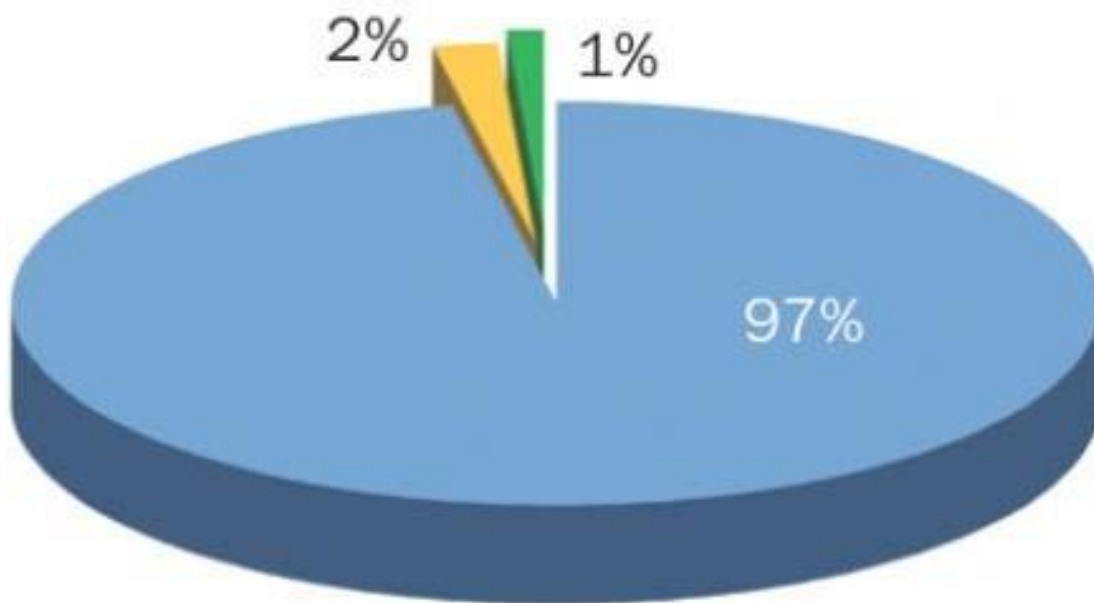
## **Resources can be grouped as-**

- Water Resources
- Mineral Resources
- Forest Resources
- Food Resources
- Energy Resources



# Water Resources

Earth's Water Resources



Salt water

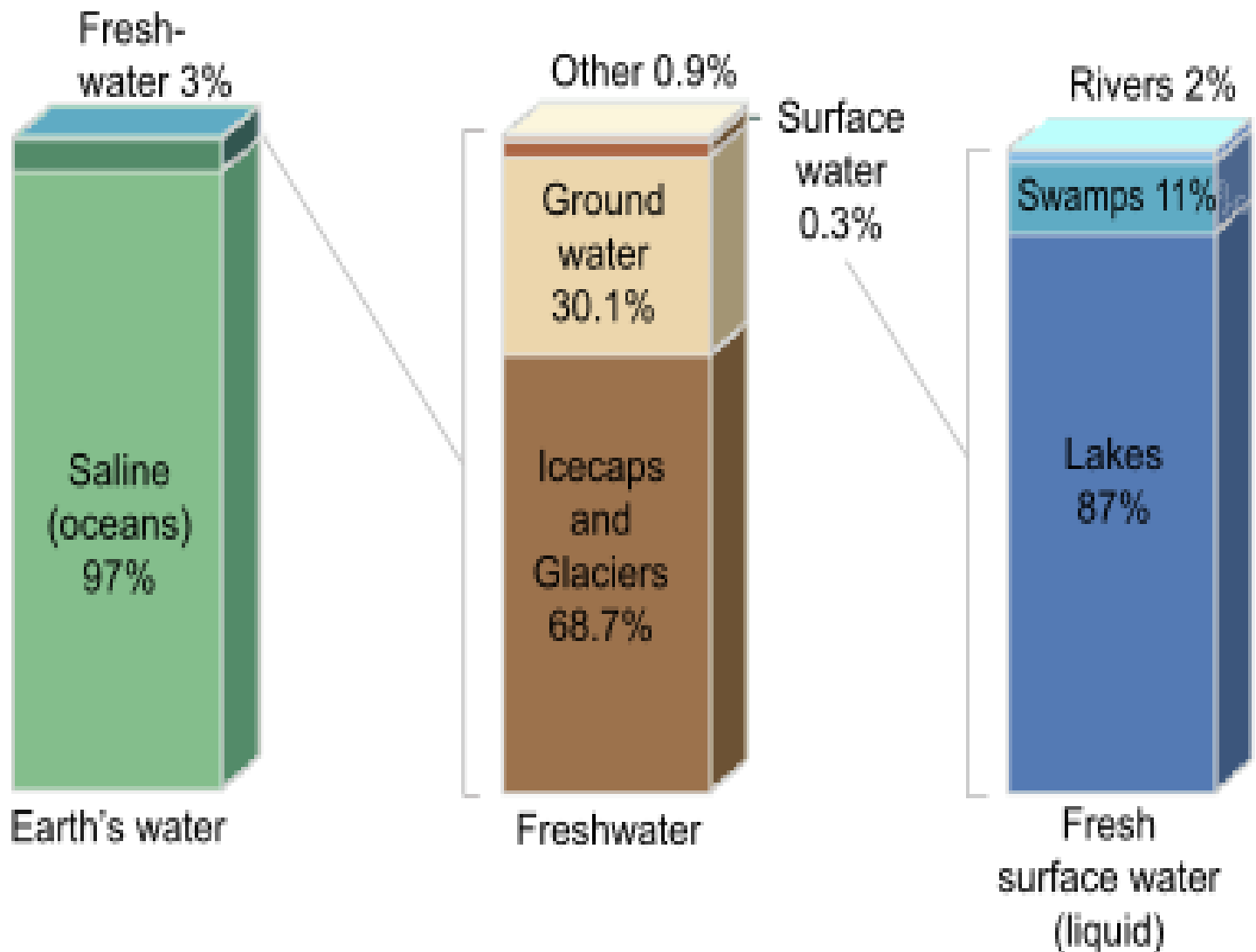


Frozen water in glaciers and ice caps



Available for human consumption

## Distribution of Earth's Water



# **Conservation of Water**

Conservation and management of water are essential for the survival of mankind, plants and animals. Water resources are sources of water that are useful or potentially useful.

Uses of water include –

Agricultural

Industrial

Household

Recreational

Environmental Activities

## **Conservation of Water**

- The majority of human uses require freshwater. 97 percent of the water on the Earth is salt water and only three percent is fresh water; slightly over two thirds of this is frozen in glaciers and polar ice caps.
- The remaining unfrozen fresh water is found mainly as groundwater, with only a small fraction present above ground or in the air.

# **Conservation of Water**

Fresh water is a renewable resource. The framework for allocating water resources to water users (where such a framework exists) is known as water rights. This can be achieved adopting the following methods:

- Growing vegetation in the catchment areas, which will hold water in the soil and allow it to percolate into deeper layers and contribute to formation of ground water.
- Constructing dams and reservoirs to regulate supply of water to the fields, as well as to enable generating hydroelectricity.
- Sewage should be treated and only the clear water should be released into the rivers.
- Industrial wastes (effluents) should be treated to prevent chemical and thermal pollution of fresh water.
- Judicious use of water in our day-to-day life.
- Rainwater harvesting should be done by storing rainwater and recharging groundwater.
- Recycling of waste water.
- Desalinization of salty water.
- Irrigation process should be improved and less water should be wasted.

# **The main reasons for the degradation of water are:**

1.To meet the need of increasing population, surface water (water from ponds, lakes, rivers, etc) and ground water are overdrawn.

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2.Sewage i.e., waste water from domestic and municipal use makes fresh water unfit for use by human beings and animals.

3.Waste water, from all industries flow down the surface water bodies and ground Water bodies and they get polluted.

# **CONFLICTS OVER WATER**

## **Kaveri River water dispute**

The sharing of waters of the Kaveri has been the source of a serious conflict between the Indian states of **Karnataka** and **Tamil Nadu**. The state of Karnataka contends that it does not receive its due share of water from the river as Tamil Nadu does. Decades of negotiations between the parties bore no fruit.

## **Godavari Water Disputes Tribunal**



# **CONFLICTS OVER WATER**

## **Godavari Water Disputes Tribunal**

**Godavari river** basin is spread in the states of **Maharashtra, Orissa**, old Madhya Pradesh {later bifurcated into present **Madhya Pradesh** (MP) and Chhattisgarh), **Karnataka** (K) and **Andhra Pradesh** (AP).

# International water dispute

The most likely sources of inter-state water conflict are the Nile drainage basin, the Tigris- Euphrates River and the Jordan River. All of these potential sites of conflict involve several countries. The conflicting water-diversion projects by Israel and Syria were a significant contributor to the 1967 Six Day War.

# Water Borne and Water Induced Diseases

Category	Comments
<i>Water-borne diseases</i>	Caused by the ingestion of water contaminated by human or animal faeces or urine containing pathogenic bacteria or viruses; includes cholera, typhoid, amoebic and bacillary dysentery and other diarrhoeal diseases.
<i>Water-washed diseases</i>	Caused by poor personal hygiene; includes scabies, trachoma and flea-, lice-, and tick-borne diseases, which are also water-washed.
<i>Water-based diseases</i>	Caused by parasites found in intermediate organisms living in water; includes dracunculiasis, schistosomiasis and some other helminths.
<i>Water-related diseases</i>	Transmitted by insect vectors which breed in water; includes dengue, filariasis, malaria, onchocerciasis, trypanosomiasis and yellow fever.

**Definition-** Any disease that can spread through contaminated water. The contamination can involve bacterial, viral or protozoan organisms. Some examples of waterborne diseases include cholera (bacteria), dysentery (bacteria or amoeba), cryptosporidiosis (protozoa), hepatitis A (virus) and giardia (protozoa). Infection can result not only from drinking the water but also from swimming in the water where it can enter the body in other ways such as through broken skin. Many poorer countries have limited uncontaminated water supplies so waterborne disease is a huge health issue worldwide.

# **Fluoride and Arsenic Problems in Drinking Water**

- An estimated 300 million people worldwide use drinking water contaminated with arsenic or fluoride.
- These trace elements are natural (geogenic) contaminants, leached into groundwater from rocks and sediments.
- Depending on the geological conditions, they may occur in concentrations which pose a risk to human health.
- The guideline values specified by the World Health Organization are 10 micrograms per liter for arsenic and 1.5 micrograms per litre for fluoride.

# **Fluoride and Arsenic Problems in Drinking Water**

- Elevated concentrations are found in particular in parts of Asia, Africa and South America. The problem thus mainly affects people in developing and emerging countries whose drinking water is obtained from groundwater wells.
- In many regions of Asia, Africa and South America, consumption of groundwater contaminated with arsenic or fluoride causes severe health problems.

# Fluoride and Arsenic Problems in Drinking Water

Regular use of contaminated water causes serious damage to health. Chronic exposure to arsenic leads to discoloration and thickening of the skin and can also cause cardiovascular disorders or cancer. Excessive fluoride levels are associated with mottling of the teeth and bone and joint deformities.

Various technologies which are suitable for arsenic or fluoride removal in developing countries, including household, community and centralized treatment systems. Arsenic removal generally involves two steps – oxidation and ion exchange. Fluoride can be removed from drinking water by filtration or precipitation.

## *Arsenic removal from water*

### **1. Small-scale water treatment**

(i) A simpler and less expensive form of arsenic removal is known as the Sono arsenic filter, using three pitchers containing cast iron turnings and sand in the first pitcher and wood activated carbon and sand in the second. Plastic buckets can also be used as filter containers.



## *Arsenic removal from water*

(i)Chaff-based filters have been reported to Reduce the arsenic content of water to 3 microgram/litre.

This is especially important in areas where the potable water is provided by filtering the Water extracted from the underground aquifer.

## *Arsenic removal from water*

### **1. Large-scale water treatment**

In some places, such as the United States, all the water supplied to residences by utilities must meet primary (health-based) drinking water standards. Regulations may necessitate large-scale treatment systems to remove arsenic from the water supply.

**3.Coagulation/filtration** (also known as flocculation) removes arsenic by coprecipitation and adsorption using iron coagulants. Coagulation/filtration using alum is already used by some utilities to remove suspended solids and may be adjusted to remove arsenic. But the problem of this type of filtration system is that it gets clogged very easily, mostly within two to three months. The toxic arsenic sludge is further disposed of by concrete stabilization.

**Energy Resources-** Energy resources are, that can be used as a source of energy.

## **Classification of Energy Resources**

**On the basis of availability-**

**(a) Primary energy resources:** These are obtained directly from the environment, as:

Fossil fuels such as coal natural gas etc.

Nuclear fuels such as Uranium, Thorium etc.

Hydro energy

Solar energy

Wind energy

Geothermal energy

Ocean energy such as tidal energy, wave energy

Biomass energy such as gobar gas

Hydrogen energy

**Secondary energy resources:** They are derived from primary energy resources as they do not exist in nature. The examples are:

Petrol, diesel, kerosene oil

CNG and LPG

Electrical energy based on coal, diesel gas

**On the basis of being older and newer-**

**1. Conventional Energy Resources-the**  
examples are:

- 1.Fossil fuel
- 2.Nuclear energy
- 3.Hydro energy

**2. Non-conventional Energy Resources-For**  
example includes-

- 1.Solar energy
- 2.Wind energy
- 3.Geothermal energy
- 4.Ocean energy
- 5.Biomass energy
- 6.Hydrogen energy

## **On the basis of renewable and non-renewable energy resources-**

**Non-renewable energy resources:** The resources which cannot be renewed or recycled are termed as non-renewable energy resources. Excessive use of fossil fuels leads to environmental pollution, out of which CO<sub>2</sub> emission is of immense concern.

**Renewable energy resources:** The resources which can be renewed or recycled are termed as renewable energy resources. These eco-friendly energy resources have the greatest potential to substitute the depleting non-renewable energy resources as alternative sources of energy in the long run. With the environmental conditions becoming worse day by day, people are trying their bit to save the environment by using natural energy resources.

## **I.Non-Renewable Energy Resources**

### **1.Fossil Fuel Based Energy**

Fossil fuels are found inside the earth's crust where they have formed through heat and compression of forests, waste and other organic matter, which got buried due to earthquake, landslide etc. Fossil fuels are of 3 types:

(a)Solid (e.g.-coal),

(b)Liquid (e.g.-petroleum)

(c)Gaseous (e.g.-Natural gas)