**UNIT-2**

**Natural Resources**

Any natural substance that occurs in nature and is used by humans for survival can be considered a natural resource. Natural resources include oil, coal, natural gas, metals, stone, and sand. Other natural resources from nature are air, sunlight, soil, and water.

**Types of Natural Resources**

Natural resources are of two types:  
**1.** **Renewable Resources or Exhaustible Resources:**Renewable resources are substances available in large amounts in nature. These resources are infinite and can be repeatedly used—for example, water, air, sunlight, etc.  
**2. Non-Renewable Resources or Inexhaustible Resources:**These resources are also available in nature but are limited. They may end after continuous usage—for example, oil and natural gas, minerals, coal, etc.

**Management of Natural Resources: Renewable and Non-Renewable**

The difference between renewable and non-renewable resources are mentioned below:

|  |  |  |
| --- | --- | --- |
| **Basis of Classification** | **Renewable Resources** | **Non-Renewable Resources** |
| Definition | These resources are naturally available in large amounts and can be used again and again. | These resources are available in limited amounts so cannot be used again and again. |
| Depletion | These resources can never be exhausted. | These are energy resources and will be depleted over time. |
| Environmental Impact | They have low carbon emissions, so they are environmentally friendly. | They have high carbon emissions and can harm the environment. |
| Cost | These resources have a very low cost. | These resources have a high cost. |
| Area Requirements | A large area is required for the installation of its power plant. | A small area is required for the installation of its power plant. |
| Sources | Examples: Solar energy, Tidal energy, and Wind energy. | Examples: Coal, Oil and natural gas, and Minerals. |

**Water Resources: Quantity and Quality**

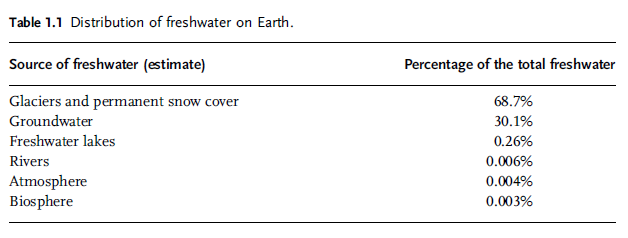
Water pollution, together with loss of biodiversity, climate change, energy and socioeconomic issues, is one of the main threats and challenges humanity faces today. Human activities and human-related substances and wastes introduced into rivers, lakes, groundwater aquifers and the oceans modify the environmental water quality and make huge quantities of water unsuitable for various uses. This is the case not only for human-related uses such as drinking, bathing, agricultural irrigation and industrial production but also for terrestrial and aquatic ecosystems for which clean, fresh water is a prerequisite for life. Water pollution is a serious problem for human health and the environment.

**Water Resources**

The total volume of water on Earth is estimated at 1360 million cubic kilometers or

This number was derived from a long-term assessment of the average amount of water stored in the hydrosphere, that is, that part of the Earth covered by water and ice, the atmosphere and the biosphere (all living organisms on Earth). About 70% of the Earths surface is covered by oceans. The salt water in the seas and oceans represents97%of the total water on Earth, the remaining 3% being fresh water.

Freshwater is distributed in different components (glaciers, rivers, lakes, groundwater, atmosphere and biosphere) as shown in Table. From this table it can be seen that the greatest part (68.7%) of total freshwater is trapped in polar glaciers and ice sheets, and is therefore not directly accessible for use. Only 0.3% of the freshwater on



Earth is surface water, in the form of lakes (87%) and rivers (2%). Water exists in three states: liquid, solid (ice and snow) and gas (water vapour). Due to the energy supplied by the sun, water is permanently being transformed from one state to another, and is in constant motion between oceans, land, atmosphere and biosphere. water in motion constitutes the hydrologic cycle through the following hydrological processes, which take place in a permanent manner.

**Over Exploitation of Fresh Water Resources**

Due to population explosion the demand of water has been increased which resulted in over exploitation of fresh water resources.

Overexploitation of fresh water resources has resulted in many serious problems which directly affect the present and future need of the people. Some of the consequences are:

**1. Lowering of water Table:**

With the increasing population and demand for dry land area is also increased. There is large exploitation of underground water due to which water table is lowering down day after day. This problem can become major threat for future agriculture because of reduced water supply in future.

**2. Water Logging:**

One of the consequences of excessive irrigation in certain areas is that it can raise the water table. Salts which are found in rocks when come in contact with these water, it moves up when evaporation takes place in upper soil layer, so it results in salinity in the soil. Excessive irrigation also leads to water logging.

**3. Sinking of ground water:**

If more ground water is withdrawn then their recharging rate, the sediments in the aquifers get compacted, this phenomena is known as ground subsidence. This sinking could results in huge economic loses like structure damage in high building, fractures in pipes etc.

**4. Saltwater intrusion**

**Saltwater intrusion** is the movement of [saline water](https://en.wikipedia.org/wiki/Saline_water) into [freshwater](https://en.wikipedia.org/wiki/Freshwater) [aquifers](https://en.wikipedia.org/wiki/Aquifer), which can lead to groundwater quality degradation, including [drinking water](https://en.wikipedia.org/wiki/Drinking_water) sources, and other consequences. Saltwater intrusion can naturally occur in [coastal](https://en.wikipedia.org/wiki/Coast) aquifers, owing to the [hydraulic](https://en.wikipedia.org/wiki/Hydraulic) connection between [groundwater](https://en.wikipedia.org/wiki/Groundwater) and [seawater](https://en.wikipedia.org/wiki/Seawater). Because saline water has a higher mineral content than freshwater, it is denser and has a higher water pressure. As a result, saltwater can push inland beneath the freshwater.

**Water conservation methods**

1. **Make effective use of soil water reserves**

Planting deeper rooting crops, such as grasses or cereals that will leverage soil water reserves more effectively than shallower rooting crops such as vegetable crops and therefore can be grown in drier period.

1. **Take measures to avoid run off**

control water movement over the soil surface, dispose safely of the excess rainfall as runoff or concentrate inadequate rainfall runoff. Remedial measures such as incorporating plantings especially in areas where runoff collects protecting trees that help absorb and filter runoff, choosing permeable materials for pathways etc. can potentially contribute to reduce run off.

1. **Use rainwater effectively**

Using rain water conservation methods like RAINWATER HARVESTING

1. **Rational Use of Groundwater**
2. **Protection of Water from Pollution**
3. **Traditional Water Conservation Methods**

#### a) Bamboo Drip Irrigation System

Bamboo is too expensive to use for a [**low- cost building**](https://vincivilworld.com/2020/06/18/cost-effective-construction/), but is a boon for people of Meghalaya. Because, they have been leveraging it for water conservation methods in India. This system of water conservation is a brilliant drip irrigation system. It uses bamboo of various sizes and reduces the output to 20-80 drops per minute, which is excellent for betel leaf and black pepper crops.

#### b) Johads

Johad is a crescent shaped small check dam built from earth and rock to intercept and conserve rainwater in Rajasthan. This helps to improve percolation and increases groundwater recharge.

#### c) Kul

Kuls are diversion channels that carry water from a glacier to village. Often spanning long distances, with some over 10 km long, kuls have been around for centuries. They are the lifeline of people of Spiti valley of Himachal Pradesh and in Jammu too.

#### d) Eri

One of the oldest water conservation systems in India of Tamil Nadu is still widely used around the State. With over a third of irrigation in the State being made possible due to Eri, the traditional water harvesting system plays an important part in the agriculture. They also have other advantages such as prevention of soil erosion, recharge of groundwater, and flood control.

#### e) Zabo

This method of conservation of water in India is a unique combination with animal care, forests and agriculture. Mostly practised in Nagaland, Zabo is used to deal with a lack of drinking water supply. During monsoon, rainwater that falls on the hilltops is collected into the pond like structures that are carved out on the hillsides. The water is then passed onto cattle yards below from where the water enters the paddy fields rich in manure.

See, such still in use water conservation model that tells the beautiful story of water use and conservation doesn’t have copyright and patent problems. It’s open to the whole world. So why can’t we be inspired by them and use suitable conservation method of water in our own lives?

## 8. ****Use of Modern Irrigation Methods****

On average, 80 percent of the fresh water withdrawn from rivers and groundwater is used to produce food and other agricultural products. Therefore, we need to pay attention to improved methods of irrigation such as sprinkler and drip irrigation that save 50 per cent water.

In the drip irrigation method, the hole pipes are spread over the surface of the soil so that the crop receives water directly. There is no loss due to evaporation and approximately 95% water is used. This process therefore uses maximum water.

## 9. ****Increasing Forest Cover****

According to recent reports, forests cover 31 percent of the world’s land surface, just over 4 billion hectares which is down from the pre-industrial area of 5.9 billion hectare. This needs to be addressed since trees bear drought conditions for a long duration as compared to crops and they are helpful in reducing the demand for water along with recharging water sources.

## 10. ****Flood Management****

**11. Reuse of Urban Waste**