

- Only 32 per cent of the available surface water can be utilized due to topographical, hydrological and other constraints.
- Water flow in a river depends on size of its catchment area or river basin and rainfall within its catchment area.
- The groundwater utilisation is very high in the states of Punjab, Haryana, Rajasthan, and Tamil Nadu due to alluvial soil and river basins.
- The States like Kerala, Orissa and West Bengal have vast water resources in lagoons and lakes. This water is used for fishing and irrigating certain varieties of paddy crops, coconut, etc.
- However, in future, with development, the shares of industrial and domestic sectors in the country are likely to increase.
- Punjab, Haryana and Western Uttar Pradesh has 85% of net sown area under irrigation.
- Ganga and Yamuna are the two most polluted rivers of India.

Q.1 Describe the availability of water resources in India.

Ans. Features of availability of water resources in India are:

- (i) India have about 4 per cent of the world's water resources
- (ii) The total water available from precipitation in the country in a year is about 4,000 cubic km.
- (iii) The availability from surface water and replenishable groundwater is 1,869 cubic km.
- (iv) Out of this only 60 per cent can be put to beneficial uses.
- (v) Thus, the total utilizable water resource in the country is only 1,122 cubic km.

Q.2 Describe the features of surface water distribution in India.

Ans. There are four major sources of surface water. These are rivers, lakes, ponds, and tanks.

- a. In the country, there are about 10,360 rivers and tributaries longer than 1.6 km each.
- b. The average annual flow in all the river basins is 1,869 cubic km.
- c. Only 32 per cent of the available surface water can be utilized due to topographical, hydrological and other constraints.
- d. The Ganga and the Brahmaputra River have 60 % of the total water resource in India.

Q.3 Describe the features of ground water distribution in India.

Ans. Groundwater resources in the country are about 432 cubic km.

- a. The Ganga and the Brahmaputra basins together have about 46 per cent of the total replenishable groundwater resources.
- b. The level of groundwater utilisation is high in the river basins in north-western region and south India.
- c. The groundwater utilisation is very high in the states of Punjab, Haryana, Rajasthan, and Tamil Nadu.
- d. States like Chhattisgarh, Orissa, Kerala, etc. have small groundwater utilization.

Q.4 State important uses of water resources in India.

Ans. Water resources are used for:

- a. **Irrigation in Agriculture:**
 - i. India's water demand is dominated by irrigational needs.
 - ii. 89 per cent of the Surface water is used for irrigation.
 - iii. 92 per cent of the Ground water is used for irrigation.

- b. **Industries:**
 - i. Its share is limited to 2 per cent of the surface water and 5 per cent of the ground-water.
- c. **Domestic:**
 - i. More of surface water i.e. 9% is used in domestic sector as compared to groundwater i.e. 3%.

Demand of Water for Irrigation

Q.5 Why the demand of water for irrigation is high in India.

Ans. Major Use of water is for irrigation in India. It is due to following reasons:

1. **Variability in rainfall:**
 - a. The spatial distribution of rainfall is uneven. Most parts of India such as north-west and Deccan plateau remain drought prone due to deficient rainfall. It becomes very difficult to practice agriculture without irrigation.
 - b. Seasonal distribution of rainfall is also uneven. Summer and winter season remain dry. Therefore irrigation is required.
2. **Uncertain Rainfall:**
 - a. Even during rainy season there are breaks in the monsoon therefore in West Bengal and Bihar irrigation is required even during rainy season.
3. **Water requirements** of certain crops such as jute, sugarcane, rice, is very high therefore the demand for irrigation is high.
4. Provision of irrigation makes **multiple cropping** possible.
5. **Agriculture productivity** is high in irrigated fields as compared to un-irrigated land.
6. **Use of high yielding seeds and fertilizers** have made the irrigation essential.
7. **Green revolution** in Punjab and Haryana was successful due to irrigation.
8. **Location:** India is located in the tropical and sub-tropical region evapo-transpiration is also high.

Q.6 What are the implications of over using of ground water resources?

Ans. The over-use of ground water resources in dry and drought prone areas has led to:

- a. Decline in ground water table in Rajasthan and Gujarat.
- b. Increased fluoride concentration in ground-water due to over withdrawal in Maharashtra and Rajasthan.
- c. Increase in concentration of arsenic in West Bengal and Bihar.
- d. Increased salinity in the soil in Punjab and Haryana.

EMERGING WATER PROBLEMS

Q.7 What are the two emerging water problems in India?

Ans. Water resources in India face many problems such as problem of availability and quality.

1. Problems of availability: Per capita availability of water is decreasing day by day. Its supply also varies with seasons.
2. Problems of quality: The quality of water is decreasing due to water pollution. Domestic wastewater, industrial effluents and chemicals used in agriculture pollute water.

Q.8 What are the major causes of deterioration of water quality in India?

Ans. The quality of the surface water and ground water decreases due to:

1. Foreign matters such as micro-organisms, chemicals, industrial and other wastes.
2. Discharge of domestic and industrial wastewater from cities and towns without treatment in rivers and lakes.
3. Excessive use of fertilizers, insecticides, and pesticides in agricultural fields.
4. Seepage of these pollutants underground.

WATER CONSERVATION AND MANAGEMENT

Q.9 Why conservation and management of water resource is necessary in India?

Ans. Water conservation and management is necessary in India due to following reasons:

- a. The availability of fresh water in many parts of our country is declining.
- b. The demand for water is increasing rapidly.
- c. Many areas face shortage of water.
- d. Sustainable development can only be achieved by water management.
- e. Its quality is getting lower by the human activities.
- f. Water available from sea/ocean is negligible due to high cost of de-salinisation. Under such view conservation of water is necessary.

Q.10 What steps/methods India has to take to conserve water resources in India?

Ans. The availability of water resources of India can be increased and conserved by:

- a. Keeping water resource **free from pollution** by treating the wastewater from cities and industries.
- b. Encouraging **recycling and reuse of water** for long run.
- c. **Watershed development**: Scientifically managing the water resource of all river watersheds.
- d. **Rainwater harvesting**: Collecting rainwater and stopping it from draining off.

A. Prevention of Water Pollution:

- i. The most polluted rivers are the Ganga River, the Yamuna River, the Sabarmati, the Gomti, and the Kali.
- ii. Water pollution in these rivers is caused by:
 - a. The intensive use of river water for irrigation, drinking, domestic and industrial purposes.
 - b. The drains carrying agricultural (fertilisers and insecticides), domestic (solid and liquid wastes), and industrial effluents.
 - c. The Low flow of water during the summer season.
 - d. The Organic and bacterial contaminations.
- iii. The water pollution in these rivers can be prevented by:
 - a. The legislative provisions such as the Water Acts and Environment Protection Acts which must be implemented effectively.
 - b. Generating public awareness and action about importance of water and impacts of water pollution.

B. Recycle and Reuse of Water:

- i. Use of low-quality water (such as recycled waste-water) for industrial purposes and fire fighting to reduce their water cost.

- ii. Similarly, in urban areas water after bathing and washing utensils can be used for gardening. Water used for washing vehicle can also be used for gardening. This would conserve fresh water for drinking purposes.

C. Watershed Management

- a. Watershed management basically refers to efficient management and conservation of surface and ground water resources and other natural and human resources within the watershed.
- b. Its involves:
 - i. Prevention of runoff of rainwater
 - ii. Storing and recharging groundwater through various methods like percolation tanks, recharge wells, etc.
 - iii. Bringing balance between natural resources and human society.
 - iv. Community participation.
- c. Some examples of watershed management are:
 - i. **Haryali** is a watershed development project sponsored by the Central Government which aims at enabling the rural population to conserve water for drinking, irrigation, fisheries and afforestation. The Project is being executed by Gram Panchayats with people's participation.
 - ii. **Neeru-Meeru** (Water and You) programme (in Andhra Pradesh) and **Arvary Pani Sansad** (in Alwar, Rajasthan) have taken up constructions of various water-harvesting structures such as percolation tanks, dug out ponds (Johad), check dams, etc. through people's participation.

D. Rainwater Harvesting

- 1) Rain water harvesting is a method to capture and store rainwater for various uses. Drops of rain water are guided to bore well, pits and wells.
- 2) Its importance can be judged by following facts that:
 - a) It is also used to recharge groundwater aquifers.
 - b) It is a low cost and eco-friendly technique for preserving every drop of rain water.
 - c) Rainwater harvesting increases water availability especially during the summer season and helps in bridging demand-supply gap.
 - d) Checks the declining ground water table by reducing dependence on ground water.
 - e) It saves energy to pump groundwater as recharge leads to rise in groundwater table.
 - f) Improves the quality of groundwater through dilution of contaminants like fluoride and nitrates,
 - g) Prevents soil erosion and flooding
 - h) Arrests salt water intrusion in coastal areas