India-People and Economy

Chapter-6 Water Resources

Key Notes:

- India accounts for about 2.45% of worlds surface area, 4% of the world's water resources and about 16 % of world's population
- The total water available from precipitation in the country in a year is about 4,000 cubic km
- The availability from surface water and replenishable groundwater is 1,869 cubic km
- Out of this only 60% can be put to beneficial uses
- The total utilisable water resource in the country is only 1,122 cubic km

Surface Water Resources

- There are four major sources of surface water
- These are rivers, lakes, ponds, and tanks
- In the country, there are about 10,360 rivers and their tributaries longer than 1.6 km each
- The mean annual flow in all the river basins in India is estimated to be 1,869 cubic km
- Due to topographical, hydrological and other constraints, only about 690 cubic km (32 per cent) of the available surface water due to topographical, hydrological and other constraints, only about 690 cubic km (32%) of the available surface water can be utilised
- Water flow in a river depends on size of its catchment area or river basin and rainfall within its catchment area can be utilized
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- About one-third of the total area in the country, have 60 % of the total surface water resources

Groundwater Resources

- The total replenishable groundwater resources in the country are about 432 cubic km
- The Ganga and the Brahamaputra basins, have about 46% of the total replenishable groundwater resources
- The level of groundwater utilisation is relatively high in the river basins lying in north-western region and parts of south India
- The groundwater utilisation is very high in the states of Punjab, Haryana, Rajasthan, and Tamil Nadu
- States like Chhattisgarh, Odisha, Kerala, etc., which utilise only a small proportion of their groundwater potentials
- States like Gujarat, Uttar Pradesh, Bihar, Tripura and Maharashtra are utilizing their ground water resources at a moderate rate

Lagoons and Backwaters

- India has a vast coastline and the coast is very indented in some states
- Kerala, Odisha and West Bengal have vast surface water resources in these lagoons and lake
- Water is generally brackish in these water-bodies, it is used for fishing and irrigating certain varieties of paddy crops, coconut, etc

Water Demand and Utilisation

- Development of irrigation to increase agricultural production has been assigned a very high priority in the Five Year Plans, and multipurpose river valleys projects like the Bhakra-Nangal,. Hirakud, Damodar Valley, Nagarjuna Sagar, Indira Gandhi Canal Project, etc. have been taken up
- Agriculture accounts for most of the surface and ground water utilisation, it accounts for 89 % of the surface water and 92% of the groundwater utilisation
- While the share of industrial sector is limited to 2% of the surface water utilisation and 5% of the ground-water
- The share of domestic sector is higher (9 %) in surface water utilisation as compared t groundwater

Demand of Water for Irrigation

- In agriculture, water is mainly used for irrigation

- Irrigation is needed because of spatio-temporal variability in rainfall in the country
- The large tracts of the country are deficient in rainfall and are drought prone. Eg. North-western India and Deccan plateau
- Water requirement of rice, sugarcane, jute, etc. is very high which can be met only through irrigation
- The main reasons behind green revolution strategy of agriculture development in the country has largely been successful in Punjab, Haryana & western Uttar Pradesh are-
    - Irrigated lands have higher agricultural productivity than unirrigated land
    - Provision of irrigation makes multiple cropping possible
    - The high yielding varieties of crops need regular moisture supply, which is made possible only by a developed irrigation systems
- In Punjab, Haryana and Western Uttar Pradesh more than 85% of their net sown area is under irrigation
- Wheat and rice are grown mainly with the help of irrigation in these states
- Of the total net irrigated area 76% in Punjab and 51% in Haryana are irrigated through wells and tube wells
- This shows that these states utilise large proportion of their ground water potential which has resulted in ground water depletion in these states
- The share of area irrigated through wells and tube wells is also very high in the states
- Rajasthan, and Maharashtra has increased fluoride concentration in ground-water, and this practice has led to increase in concentration of arsenic in parts of West Bengal and Bihar

Deterioration of Water Quality

- Water gets polluted by foreign matters such as micro-organisms, chemicals, industrial and other wastes. Such matters deteriorate the quality of water and render it unfit for human use
- The main causes of deteriorate water is when toxic substances enter lakes, streams, rivers, ocean and other water bodies, they get dissolved or lie suspended in water. This results in pollution affecting aquatic systems
- The Ganga and the Yamuna are the two highly polluted rivers in the country

Water conservation and management

- Due to declining availability of fresh water and increasing demand, the need has arisen to conserve and effectively manage this precious life giving resource for sustainable development
- Steps for water conservation are - need to encourage watershed development, rainwater harvesting, water recycling and reuse, and conjunctive use of water for sustaining water supply in long run

Prevention of water pollution

- The Central Pollution Control Board (CPCB) in collaboration with State Pollution Control Boards has been monitoring water quality of national aquatic resources at 507 stations
- The data obtained from these stations show that organic and bacterial contamination continues to be the main source of pollution in rivers
- The Yamuna river is the most polluted river in the country between Delhi & Etawah
- Other severely polluted rivers are: the Sabarmati at Ahmedabad, the Gomti at Lucknow, the Kali, the Adyar, the Cooum (entire stretches), the Vaigai at Madurai and the Musi of Hyderabad and the Ganga at Kanpur and Varanasi
- Groundwater pollution has occurred due to high concentrations of heavy/toxic metals, fluoride. and nitrates at different parts of the country

Recycle and reuse of water

- We can improve fresh water availability is by recycle and reuse
- Steps to recycle and reuse of water-
    - Use of water of lesser quality such as reclaimed waste-water would be an attractive option for industries for cooling and fire fighting to reduce their water cost
    - 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

Watershed Management

- Watershed management basically refers to efficient management and conservation of surface and groundwater resources

- It involves prevention of runoff and storage and recharge of groundwater through various methods like percolation tanks, recharge wells, etc
- Watershed management includes conservation, regeneration and judicious use of all resources – natural (like land, water, plants and animals) and human with in a watershed
- Watershed management aims at bringing about balance between natural resources on the one hand and society on the other
- The success of watershed development largely depends upon community participation
- The Central and State Governments have initiated many watershed development and management programmes in the country are-
    - Hariyali- It 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
    - Neeru-Meeru (Water and You) programme (in Andhra Pradesh) and Arvary Pani Sansd (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. Tamil Nadu has made water harvesting structures in the houses compulsory. No building can be constructed without making structures for water harvesting.

Rainwater Harvesting

- Rain water harvesting is a method to capture and store rainwater for various uses
- It is also used to recharge groundwater aquifers
- It is a low cost and eco-friendly technique for preserving every drop of water by guiding the rain water to bore well, pits and wells
- Rainwater harvesting increases water availability, checks the declining ground water table, improves the quality of groundwater through dilution of contaminants like fluoride and nitrates, prevents soil erosion, and flooding and arrests salt water intrusion in coastal areas if used to recharge aquifers
- Traditional rain water harvesting in rural areas is done by using surface storage bodies like. lakes, ponds, irrigation tanks, etc

- In Rajasthan, rainwater harvesting structures locally known as Kund or Tanka (a covered underground tank) are constructed near or in the house or village to store harvested rainwater
- Scope to use rainwater harvesting technique to conserve precious water resource are-
    - it can be done by harvesting rainwater on rooftops and open spaces
    - harvesting rainwater also decreases the community dependence on groundwater for domestic use
    - it can also save energy to pump groundwater as recharge leads to rise in groundwater table
    - Urban areas can specially benefit from rainwater harvesting as water demand has already outstripped supply in most of the cities and towns
    - The issue desalinisation of water particularly in coastal areas and brackish water in arid and semi-arid areas, transfer of water from water surplus areas to water deficit areas through inter linking of rivers can be important remedies for solving water problem in India
    - The most important issue from the point of view of individual users, household and communities is pricing of water

Case study Ralegan Siddhi

- It is an example for watershed development
- A retired army personnel realized the importance of water shed and convinced the public
- Voluntary participation took place and developed the water shed
- The status of village is changed
- Dependency started declining
- Tarun mandal was formed to control pollution
- Controlled grazing started
- Dry crops were started growing
- Community leaders took the control of the village
- People developed each other
- It is the model village in India