

Chapter - 4

Water Resources

* Water Resources of India

- ↳
- 2.4 percent of World's surface area
 - 4.1% of world's water resources
 - 17% of world's population.
 - Total water availability from precipitation is 4000 cubic km per year.
 - Availability from ~~surface~~ and replenishable ground water is 1869 cubic km.
 - 60% put to beneficial use only.
 - Utilisable water is 122 cubic km.

(i) Surface Water Resources.

- ↳
- Four major sources are rivers, lake, ponds & tanks.
- There are about 10,360 rivers.
 - Mean annual flow in all river basin in India ~~estimated to~~ be 18,69 cubic km.
 - Due to ~~topographical~~, hydrological and other constraints only about 690 cubic km can be utilized.
 - Water flow in a river depends on size of its catchment area on river basin and rainfall within its catchment area.

(ii) Groundwater Resources

- Total replenishable groundwater resources in the country are 432 cubic km.
- Groundwater level utilisation is relatively high in river basins lying in NW regions & parts of south India.
- Very high utilisation:- Punjab, Haryana, T.N.
- Moderate :- U.P, Bihar, Tripura
- Low :- Odisha, Kerala, Chhattisgarh etc

(iii) Lagoons and Backwaters

- India has a vast coastline and coast is very indented in some states.
- Due to this a number of lagoons and lakes have formed. Eg: Kerala, Odisha & W.B.
- Water is Brackish, it is used for fishing, and irrigation of paddy crops, coconut etc.

(iv) Water demand and Utilisation

- India as an agrarian economy. Two-third population dependent on agriculture.
- ↓
• Hence development of irrigation to increase agricultural production in five year plans.

• Multipurpose river valleys project, like Bhakra Nangal, Hirakud, Damodar etc.

• Agriculture. Surface water utilisation $\rightarrow$ 89.1%
Groundwater utilisation $\rightarrow$ 92.1%

• Agricultural sector share in total water utilisation is much higher than other sectors.

(v) Demand of water for Irrigation.

$\rightarrow$ Water is mainly used for irrigation in agriculture.



because of spatio-temporal variability in rainfall
• Large tracts of country are deficient in rainfall and are drought prone.

• Water need for certain crops also makes irrigation necessary. eg rice, sugarcane, jute etc.

• Irrigation make multiple cropping possible & it is also found that irrigated land have higher agricultural productivity than unirrigated land.

• It made Green revolution successful and Punjab, U.P & Haryana more than 85% of net sown area is under irrigation.

- Over-use of groundwater resource has led to decline in groundwater table in these states.
- Withdrawal had increased fluoride concentration in groundwater & practice has led to increase arsenic concentration in parts of W.B & Bihar.

* Deterioration of water quality

→ Water quality refers to water without any foreign substance which is unwanted in it. Resulting in water pollution.

→ Such as micro-organisms, chemicals, industrial and other wastes.

make water unfit for human use.

- Also affecting aquatic systems, all pollutants seep down and pollute groundwater.

← (i) Water conservation and Management.

→ Since there is a declining availability of freshwater and increasing demand, the need has arisen to conserve and effectively manage it.

- Ways to conserve are
 (i) Water-saving technologies

- Make effective laws and policies for its conservation
- Encourage watershed development, rainwater harvesting, water recycling and reuse and conjunctive use.

(ii) Prevention of water pollution.

Available water resource is degrading rapidly

↓ because of

(i) Drains carrying agricultural, domestic and industrial waste are dumped into rivers.

(ii) Intensive use of water in irrigation, drinking, domestic & industrial purpose.

→ [How to prevent it?]

(a) Central pollution control board (CPCB) with collaboration with State govt, has been monitoring water quality of national aquatic resources at 507 station

↓ [What does the report show?]

(i) Organic & bacterial contamination. — main source of pollution in rivers

(ii) Yamuna, most polluted river.

(iii) Groundwater pollution due to heavy / toxic metals, fluoride & nitrates.

(b) Legislative provisions
↳ (i) Water prevention and control of pollution
Act 1974.

(ii) Environment Protection Act 1986.

(iii) Water Cess Act 1977

(c) Generate strong sense of public awareness about imp of water.

(iii) Recycle and Reuse of Water

↳ Another way to improve freshwater availability.

↓
• Use water of lesser quality for industrial cooling units. & fire fighting. Reducing water cost.

• Use bathing and Utensil washing water for Gardening in Urban areas. Car washing water also

Imp

* Watershed Management.

↳ Refers to effective management and conservation of surface and groundwater resources.

↓
Involves

(i) Prevention of runoff

(ii) Storage and recharge of groundwater through
↳ precolation tanks and recharge wells

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- Broad Sense include Conservation, regeneration and judicious use of all resources.
- Its success depend on community participation.

↳ Some examples

i) Haryali → project sponsored by Central govt which aims at enabling the rural population to conserve water for drinking, irrigation, afforestation & fisheries

↳ Executed by Gram Panchayat with people's participation.

ii) Neeru-meru [Water & you] → in Andhra Pradesh

iii) Anvay Pani Sansad → in Alwar, Rajasthan.

Imp [Note: Tamil Nadu has made water harvesting structures compulsory in the houses.]

- Overall → There are few success stories. In majority cases the programme is still in its nascent stages.

* Rainwater Harvesting.

↓ A method to capture and store rainwater for various use.

- Used to recharge groundwater aquifers.
 - It is low-cost and eco-friendly technique to preserve rainwater to borewells pits and wells.
 - Increase availability of water & check groundwater table.
 - Prevents soil erosion & flooding.
 - Save energy to pump groundwater.
- Rainwater harvesting is practised using various methods.

↳ Traditional Rain Harvesting

↳ Done using surface storage bodies like lakes, ponds, irrigation tanks.

• In Rajasthan structure known as Kund or Tankas are constructed near house or village.

- There are wide range of techniques to conserve rainwater.

↳ Harvesting rainwater on rooftops and open areas

- Moreover the issue desalination of water particularly in coastal and brackish water; transfer of water from water surplus areas to water deficit through inter-linking of rivers can be important remedial for solving water problem in India.

- Most important issue from point of view of individual users, household and communities is pricing of water.

- India's National Water Policy 2012

Objective → assess the existing situation and to propose a framework for plan of action with a unified national perspective.

Features:-

- Emphasis on national law, optimum development of inter state rivers & river valleys
- Adaptation of strategies in view of climate change.
- Removal of disparity in stipulations for water supply.

- Jal Kranti Abhiyan [2015-16]

aim to ensure per capita availability of water in the country.

↳ also involving local bodies, NGOs and citizens in creating awareness regarding its objectives.

Activities

- Selecting 1 gram (village) which is water stressed in 672 districts to create 'Jal Gram'.
- Identification of model command area of about
- Abatement of pollution
 - Water conservation
 - Reducing groundwater pollution
- Creating mass awareness through social media.

↳ Designed to provide livelihood, food security through water security.