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Q14

Suggest measures to improve water storage and irrigation system to make its judicious use under depleting scenario.

UPSC Civil Services Mains 2020 · GS III · 15 marks · Crops, Irrigation and Marketing

Major crops - cropping patterns in various parts of the country; different types of irrigation and irrigation systems; storage, transport and marketing of agricultural produce and issues and related constraints; e-technology in the aid of farmers.

Core demand of the question

- Suggest measures to improve water storage and irrigation system to make its judicious use under depleting scenario
- Keep the explanation within a 15-mark length

Revision summary

Depletion requires storage that recharges, not only more pumps.

Tanks, watersheds, and managed aquifer recharge are the distributed store.

Micro-irrigation, canal efficiency, and working water-user associations cut waste.

Cropping and electricity reform decide whether drip subsidies are real savings.

PMKSY, Atal Bhujal, MGNREGA, and Jal Shakti Abhiyan are the named instruments.

Introduction

Indian irrigation grew by capturing monsoon in canals and then by mining aquifers with pumps. Under a depleting scenario - falling water tables, silted tanks, climate-erratic rain - the task is to store more where it recharges, move water with less loss, and apply it as a crop need, not as a free flood. Judicious use is pricing, cropping, and engineering together.

Body**Store more, and store in the right place**

- **Revive tanks, ponds, and traditional systems** (ahar-pyne, johads, temple tanks) through **MGNREGA** and **Jal Shakti Abhiyan**-type drives, with silt as a farm input, not a dump.
- **Watershed and check-dam** work on a ridge-to-valley plan so storage is a chain, not a single celebrity reservoir.
- **Underground storage:** managed aquifer recharge, percolation tanks, and **Atal Bhujal Yojana** community water-budgets in stressed blocks.
- **Reservoir operation:** carry-over storage, desiltation where economic, and conjunctive use so canals and wells are one system.
- Urban **rainwater harvesting** and treated-wastewater reuse for industry and horticulture, to take pressure off irrigation freshwater.

Irrigation hardware that wastes less

- **Canal lining and piped distribution** where seepage is loss, not recharge (lining is not always wise over a depleted aquifer that needs leakage).
- **Micro-irrigation:** drip and sprinkler under **PMKSY-Per Drop More Crop**, with actual electricity and agronomy, not only a subsidy for pipes that lie unused.
- **On-farm storage** (farm ponds) for horticulture, with safeguards against illegal groundwater fill.
- **Pressurised irrigation from canals** (as in some Gujarat and Maharashtra commands) to cut field-to-field flooding.
- Repair of **last-mile outlets** and participatory irrigation (**PIM / WUAs**) so the tail-ender actually receives a turn.

Judicious use under depletion

- **Cropping pattern:** shift thirsty paddy and sugarcane off over-exploited blocks; millets, pulses, and oilseeds with procurement that is real.
- **Power and water pricing:** flat-free electricity is a pump subsidy to mine water. Solar pumps (**PM-KUSUM**) need **feed-in / grid** options so farmers sell power instead of pumping 24 hours.
- **Soil moisture and scheduling:** agro-met, sensors for large commands, and **Soil Health Cards** so irrigation is not a substitute for agronomy.
- **Legal and institutional:** groundwater acts that are enforced, community metering, and **CGWB** assessment as a binding planning input, not a PDF.
- **Inter-linking and large dams** are not the first answer in a depleting local aquifer; they move a problem unless command-area efficiency is already high.

What not to do

- More tube-wells as 'irrigation development' in dark zones.
- Storage that evaporates in shallow open pits in arid heat without a recharge purpose.
- Ignoring **command-area development** after a dam is built - India's old sin.

Flow diagram

Depleting water -> Tanks recharge aquifers
 Depleting water -> Drip lined canals PIM
 Depleting water -> Crop and power reform
 Tanks recharge aquifers -> Judicious use
 Drip lined canals PIM -> Judicious use
 Crop and power reform -> Judicious use

Conclusion

Under depletion, store in tanks, watersheds, and aquifers; irrigate through micro-systems and honest canal tails; and use less by changing crops and pump incentives. **PMKSY**, Atal Bhujal, MGNREGA water works, and Jal Shakti campaigns are the toolkit. A new dam without demand management is not judicious use.

Facts & figures

PMKSY

Pradhan Mantri Krishi Sinchayee Yojana: Har Khet Ko Pani plus Per Drop More Crop and watershed components.

Atal Bhujal Yojana

World Bank-assisted groundwater management in selected stressed States, built on community water budgets.

CGWB assessment

Central Ground Water Board classifies blocks as safe, critical, or over-exploited - the depleting-scenario map.

PM-KUSUM

Solar agriculture pumps; needs grid-sale design so solar does not only intensify pumping.

PIM / WUA

Participatory irrigation and water-user associations meant to police turns and maintenance on canals.

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