# Irrigation in India: Reading by Vaidyanathan A.

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BA(P) EDPI II

#### 1 Water as a Common Property Resource (CPR)

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#### Common Property Resources (CPRs) and market failure

- CPRs are resources which are rival in consumption but non-excludable.
- Resources/goods are rival if consumption of that good by an individual restricts the availability of the same good to others. Eg., a burger bought at a restaurant by person X restricts the availability of the same burger to others.
- Excludable resources/goods are those for which an individual or certain groups of people can be excluded from consuming them. Eg., any commodity that can be priced is excludable. The right to consume the good lies on the individual who pays the price and buys the same from the market.
- Local ponds, rivers, grazing fields in India are rival but non-excludable in nature. Note that these resources are not priced (non-excludable) but consumption by one restricts access to others (rival).

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#### Common Property Resources and market failure

- Hence, water resources used for irrigation are CPRs.
- Due to absence of well-defined property rights, this resource has missing markets.
- Consequently, there is over-exploitation of such resources which poses threats on sustainability (eg. ground water depletion).
- Free markets do not work.
- The State has to intervene and design policies to achieve social optima.

Trends

- Net irrigated area has increased from 24 million hectares in 1953-54 to nearly 83 million hectares in 2005-06.
- Inter-regional disparities in the extent and sources of irrigation and their development over time.
- More disparity in groundwater irrigation sources as opposed to surface water irrigation.
- Disparity in the proportion of gross irrigated area to total crop area (irrigation ratio).
- Access to irrigation among farming population is unequal.
- Increase in irrigation ratio across size classes, however, the rate of increase is higher for larger holdings.

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Trends

- Positive relation between size of holdings and the proportion of households having access to any irrigation.
- In contrast, negative relation between size of holdings and irrigation ratio.

Policies

- Expansion of irrigation emerged as a primary strategy for increasing agricultural production.
- In the 1950s, government directly invested on irrigation and flood control.
- Investment was directed towards construction of new reservoir based canal systems, small-scale surface irrigation work (including tanks, local stream diversions, and lift irrigation) and public tube-wells.

- Huge disparities in investment were witnessed: more funds were allocated to large scale projects.
- Facilitation of groundwater exploitation through favourable credit policies to farmers for irrigation.
- Rural electrification programme and provision for 'cheap' electricity and diesel oil for pumping.

Impacts

- Reduction in costs of lifting water brought about by energised pumps.
- Coupled with the effects Green Revolution, there was enhancement of potential for increasing yields.
- Increased private profitability of groundwater irrigation boosted private investment in wells and tube-wells.

Impacts

- Sustained increase in importance of groundwater as an irrigation source from less than 30 per cent in 1951 to nearly 60 per cent in 2000-01 and further rise to 62 per cent in 2014-15.
- Localised groundwater sources saved time, effort and costs.
- Greater flexibility to adjust irrigation based on actual condition of crops.
- In contrast, expansion of surface water irrigation was not substantial.
- All the increase is attributed to large reservoir based canal systems.
- There was no improvement is small scale surface irrigation.
- However, large reservoirs provided larger and more reliable supplies.
- In all, there was greater efficiency in water use due to conjunctive use of both groundwater and surface water sources.

Recent policies: Drip and Sprinkler Irrigation

- Recently, focus on water use efficiency at farm level through precision or Micro Irrigation (drip and sprinkler irrigation) has gained popularity.
- Strengths of this technology include efficient deployment of inputs such as water, electricity, fertilisers, labour, increase in crop productivity, better quality of produce leading to higher realisation of sale price resulting in increased income of farmer.
- With this technology, additional area can be irrigated with the same amount of water compared to conventional method of irrigation.
- Water deficient, cultivable waste land and undulating land areas can be brought under cultivation due to ease of irrigation.
- Good scope for closely spaced crops like rice, wheat, onion, potato etc.

Recent policies: PMKSY, PDMC, MIF

- The Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) launched on 1st July, 2015 with the motto of 'Har Khet Ko Paani' for providing end-to end solutions in irrigation supply chain, viz. water sources, distribution network and farm level applications.
- Per Drop More Crop component of PMKSY (PMKSY-PDMC), operational from 2015-16 focusing on water use efficiency at farm level.
- A dedicated Micro Irrigation Fund (MIF) created with NABARD has been approved with an initial corpus of 5000 crore rupees facilitating the states in mobilising the resources for expanding coverage of Micro Irrigation.

## Primary concerns

Economic and technical concerns

- Skewed public investment in irrigation projects across regions as well as sources.
- Overambitious planning: funds directed to new projects instead of improving the efficiency of existing and incomplete projects.
- Delays in project completion, accumulation and over-capitalisation, under-utilisation of their potential.
- Severe underestimation of project costs due to inadequate preparatory investigations and laxity of pre-clearance appraisals.

## Primary concerns

Social and environmental concerns

- Most projects are accessible to larger farms at the expense of small holders due to increased role of private players.
- Irrigation projects attract criticism due to displacement of human population, submergence of forests, adverse effects on riverine and estuarine ecosystems.
- Over-exploitation of exhaustible resources leading to groundwater depletion, fall in the groundwater table.
- Threats to sustainability.

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Water-use efficiency

- Imperative to ensure conservation and efficient use of available supplies.
- Increasing the proportion of surface and groundwater drawn at source that is effectively available for consumptive use of crops.
- Flexible management of the timing and quantum of water application to crops to achieve higher yields per unit of consumptive use.
- Efficient and undamaged distribution networks from source to end-user to minimise leakages and volume of water lost to evaporation.

Water-use efficiency

- Conjunctive use of groundwater as well as surface water sources to ensure sustainability.
- Investment in installation of physical structures at all levels of canal systems to enable better regulation of water deliveries.
- Generating flexibility by creating small ponds and by extensive recycling of seepage in canal commands.
- Investment in favour of improving efficiency of existing systems and move away from new constructions.

Water governance

- Stringent regulation for controlling unauthorised and illegal tapping of canal water, pumping of water from under riverbeds to areas outside the commands.
- Identifying key areas (gray blocks) where groundwater is over-exploited and prohibiting construction of wells in such areas.
- State intervention is pertinent in management of water resources since they qualify as CPRs.
- Decentralisation of power in management of CPRs: State to act as a trustee to matters relating to water, leaving investment, management and regulatory functions to autonomous organisations.
- Radical institutional reforms in order to facilitate user involvement and active participation in management.

Economic incentives for efficient use of water resource

- Better laws, better enforcement of laws, and better management are necessary but not sufficient conditions to ensure water use efficiency.
- Complementary economic incentives are essential.
- Effective input pricing policy (energy, electricity, water, oil) is germane to the issue.
- Cost based pricing would act as an incentive: pricing of inputs based on their costs.
- However, pricing of water is a politically sensitive issue and seems to be far-fetched.