Socio-Economic Implications: Conversion of Farm Ponds into Surface Storage Tanks in Semi-Arid Maharashtra

POLICY BRIEF: January 2020

Context:

- Farm ponds have been promoted through the central and state government programmes in India as a drought mitigation measure to secure agrarian livelihoods.
- While farm ponds were initially developed to harvest rainwater, these ponds are now used as groundwater storage structures for which farmers extract large quantities of groundwater from borewells and deep wells. Furthermore these ponds are lined with plastic which prevents percolation, while it exposes the stored water to high evaporation loss.
- Indian agriculture is heavily dependent on groundwater resources, which is rapidly lowering the groundwater levels.

Key Recommendation:

Policies and interventions should ensure that farmers follow the specified norms and the dimensions for farm ponds and implement regulating measures to control the practice of groundwater extraction to fill the farm ponds.

Introduction:

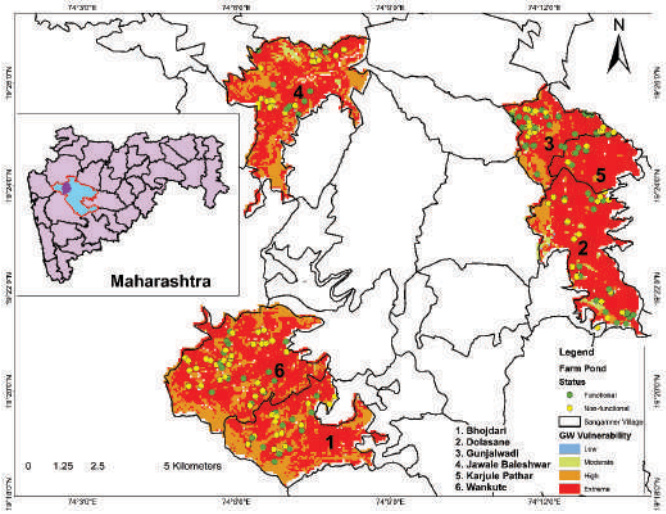
The major concern in the present context of farm ponds is the deviation from the recommended pond dimensions and its original purpose of harvesting rainwater. Conversion of farm ponds into groundwater storage structures leads to the indiscriminate abstraction of groundwater. This is in contradiction to the Maharashtra Groundwater Act, 2009 which prohibits unregulated groundwater extraction.

Objectives:

- To conduct an economic assessment of farm ponds converted to groundwater storage structures through cost benefit analysis, which includes indirect costs involved, such as evaporation losses and land opportunity cost.
- To provide insights into the economic, environmental and social aspects of farm ponds and to assess if its current usage fulfills the intended purpose of climate change adaptation that moves towards building resilience.

Study Area:

- This study was conducted in 2016-17, across six villages of the Sangamner block, Ahmednagar District in Maharashtra, selected on the basis of groundwater vulnerability as indicated by hydrological investigations.



Map 1: Location map of selected villages and spread of farm ponds in study area

Methods:

- Cost Benefit analysis (Liang et al. 2007) of 206 farm ponds was conducted with two scenarios: one considering direct investment costs (construction, lining, electrical connections, etc.) and the second, considering the indirect costs (evaporation losses and land opportunity cost).

Research Findings:

- Only 30% of the 206 farm ponds were in use while the remaining 70% of farm ponds were defunct due to insufficient funds, ineligibility to receive subsidies because of incorrect site selection and non-affordability of the good quality plastic lining. The dead investment from the 144 defunct farm ponds constructed amounts to INR over 10 million.
- Cost-benefit analysis shows that for the owners, the farm ponds are economically beneficial, provided that the indirect costs are minimized.
- Small farm ponds fare better as compared to the large ones in terms of returns on investments, due to lower surface evaporation losses and also lesser land area occupied by small farm ponds (Refer Table 2).
- From the 62 (30%) farm ponds in use, an amount of 4650 m^3 of water was lost in evaporation in the year 2016-17.

Table 1 shows indirect costs (i.e. costs that farmers could have saved) involved in farm pond usage.

Table 1: Average value of losses of farm ponds in use (in INR)

Indirect Costs	Large	Small
Opportunity costs due to water loss from evaporation	60,913	11,781
Land Opportunity loss due to area occupied by farm pond	13,620	842

Table 2: Farm pond size-wise Average Return on Investments (in INR) and Benefit Cost Ratio

Farm pond size*	Average gross RoI per farm pond	Benefit Cost Ratio	Average net RoI per Farm pond	Benefit Cost Ratio
Large	167,361	1.76	92,828	0.99
Small	29,900	2.47	17,278	1.21

by Mushtaq et al., 2000

Policy Recommendations:

- It is essential to have a regular monitoring system in place, so that farmers adhere to prescribed guidelines for constructing farm ponds rather than mal-adapt by converting them into groundwater storage structures, which in turn makes them vulnerable to future risks of groundwater depletion and debts.
- Well-informed decisions on efficient use of farm ponds, along with wise crop selection and good agronomic practices, should be promoted to make farm ponds an important support system to the farmers.
- Rigorous regional pilots should be implemented and assessed, so as to make the use of farm ponds an economical, environmental and socially beneficial intervention.

References:

1. Liang, Xiao & van Dijk, Meine. (2011). Economic and Financial Analysis on Rainwater Harvesting for Agricultural Irrigation in the Rural Areas of Beijing, Resources Conservation and Recycling - RESOUR CONSERV RECYCL. 55. 1100-1108.
2. Mushtaq, S., et al. (2000). An assessment of the role of ponds in the adoption of water-saving irrigation practices in the Zhanghe Irrigation System, China. Agricultural Water Management, 83, (1-2).

Additional Sources: Blog: https://farm-ponds-in-semi-arid-areas-of-maharashtra

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Watershed Organisation Trust (WOTR)
2nd floor, The Forum, Padmavati Corner, Pune - Satara road Pune - 411009; Phone: +9120 24226211; Web: www.wotr.org; Email: info@wotr.org