

Impact Assessment of Farm Ponds on Beneficiaries and Technology

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ABSTRACT

In low to medium rainfall rain fed regions, the occurrence of high intense rainfall events with the short duration is very common causing the soil erosion. Hence, the efficient rain water management is necessary to improve water productivity and defend the natural resource base in rainfed regions. Farm pond technology has very good potential for implementation in different schemes of state or central government. Hence the present study was undertaken with the purpose to see impact of farm pond on beneficiaries and technology.

Keywords: Development Programme, implementation of farm pond technology, Impacts of farm pond technology

1. INTRODUCTION

Water is the limiting factor for farming forestry and animal husbandry. Conservation of the environment and sustainable utilization of natural resources are major issues of concern within the international community. Land degradation is a serious environmental problem worldwide and a major threat to the sustainability of agriculture and economic development. Well managed natural resources are the key to socio-economic development and water is very often a key factor to improved natural resources management and ecological restoration. The water resources, especially in arid, semiarid regions are subject to great variability and uncertainty leading to constraints in food production and water availability for households and industries. The rainwater harvesting techniques are used to utilize rainwater more efficiently to benefit households' needs and farming and also to avoid problems of flooding. In urban areas, growing water scarcity and poor water quality is widespread.

Farm ponds are water harvesting structures used for several purposes of farm need. Farm pond is used for storing the monsoon rainwater, which is used for irrigation. Farm ponds are expected to have an impact on cropping pattern, productivity, employment, and income of the farmers. (L.B.Kunnal, et al, 2007). Farm ponds, even though limited in terms of size and water capacity, perform very significant roles in various aspects according to their proper placement in the watershed context. The farm pond impacts indicate not only increasing crop yields in both the rainy and the dry seasons, but also reduction of downstream sediment load (LDD, 2004). The improved crop management practices compared with change in cropping pattern have contributed for providing additional employment among farmers. In addition to this, during off-season, construction of farm-ponds, was also contributed to increasing employment among the farmer who have farm ponds. (Rajeshwari Desai, et al, 2007). The impact of Farm Pond on soil, water and

plant relationship of an agricultural and also on the socio-economic status of the farmers are considered as the main theme of this study.

2. OBJECTIVE OF THE STUDY

The general objective of the study is to assess the impact of rainwater harvesting ponds on crop yield using a quantitative approach supplemented by a qualitative approach. In particular the study focuses on:

- Identifying the determinants of household decision to adopt rainwater harvesting ponds.
- Examining the impact of rainwater harvesting ponds on crop yield, input use and cropping pattern.
- Assess the constraints and options to improve rainwater harvesting ponds
- Assess the differential impact of the technology by gender
- Assess indigenous rainwater harvesting technologies and practices
- Derive policy implications to improve the performance of the rainwater harvesting ponds.

3. REVIEW OF LITERATURE

Government of India's Rural Development and Poverty Alleviation Programmes have been evaluated by various Government organisations viz. Programme Evaluation Organization of the Planning Commission, Concurrent Evaluations carried out by the Ministry of Rural Development with the help of reputed institutions located at the regional level, RBI, NABARD, IFMR, NIUA, NIRD and other organizations like Universities, Research Institutes, NGOs, and Individuals. Their approaches, conceptualization and methodology laid their focus on the success and shortfalls in terms of performance, as measured by income and employment generation or assets creation. But they have not attempted to quantify the negative externalities of the programmes, as their conceptualization (theoretical caveat) was limited in focus and was constrained by the immediate requirement of the policy makers

Bina Agarwal (1997) analysed the interrelationships between gender, poverty and the environment in rural India, focusing especially on regional variations and temporal shifts over 1971-91. Briefly identifying the major factors underlying environmental degradation, the study traces why and how this degradation and the appropriation of natural resources by the state (statization) and by some individuals (privatization), tend to have particularly adverse implications for the female members of poor rural households. She further examined Governmental and community initiated attempts at environmental protection and regeneration and computed an aggregate index GEP (V) to address those issues.

COMPONENTS OF FARM PONDS DEVELOPMENT PROGRAMME

The components of watershed development programme would include; (i) soil and land management (ii) water management (iii) crop management (iv) afforestation (v) pasture or fodder development (vi) livestock management (vii) rural energy management (viii) other farm and non-

farm activities (ix) and development of community skills and resources. All these components are interdependent and interactive.

IMPACT ASSESSMENT

- Increase in ground water level

Increase in ground watershed areas is one of the important measurable indicators of successful watershed programme. Various factors are accountable for increase in ground water. The water harvesting structures play a key role by storing water and allow sufficient time for water to percolate into the ground. Land development activities such as contour bunding land levelling and cultivation practices also contribute towards accumulation of ground water. The increased water levels also render some respite in the drinking water situation in the project villages.

SOIL EROSION REDUCTION

The best performing watersheds are those where soil erosion was reduced by more than 50 percent and the worst performing are the ones where there is 19 an increase in soil erosion or the implementation failed in arresting soil erosion. Uttar Pradesh and Tamil Nadu feature in best performing states. This could be attributed to the fact that there is a linkage in quality and status of water harvesting structures. In other states as well there is reduction in soil erosion but with certain degree of variations.

RUNOFF REDUCTION

With regards to runoff reduction it was observed that the programme is successful in achieving this goal. Runoff is indicating a positive impact in most of the project areas. According to the beneficiaries this has been possible because of the contour bunding or field bunding which has also helped in checking the runoff of rainwater resulting in soil moisture retention.

LAND USE PATTERN, CROPPING PATTERN AND AGRICULTURAL PRODUCTIVITY

There is an attempt here to understand how the WDPs have helped improving land use pattern and agricultural productivity across different watershed regions. In order to give a general picture of the scenario, the central government schemes of IWDP, DPAP and DDP evaluated by the established organizations are taken into consideration for review and analysis.

FARM POND TECHNOLOGY

India receives about 4000 billion cubic meters (BCM) of precipitation every year, of which 1869 BCM flows as average annual run-off in various river systems of the country. Due to geographical limitations, only about 690 BCM of surface water can be utilized in addition to 432 BCM of replenish able groundwater, out of which only 63% of the surface water is utilized⁴. Farm ponds when constructed in loose textured soils as in the case of Alf sols require lining to minimize seepage, whereas ponds in clayey soils such as Vertisols having negligible seepage may

not require lining. However, unlined farm ponds in soils having higher seepage can be utilized to recharge the aquifers.

IMPACTS OF FARM POND TECHNOLOGY: ON-FARM

The micro-watershed with slopes ranging from 1% to 5% consisted of crop land (1.47 ha), vegetables (0.13 ha), horticulture (1.43 ha), pasture (0.92 ha) and fallow land (0.05 ha). The conservation measure taken up was graded bunding (0.375 m²) with a vertical interval of 1.0 m. At the outlet, a farm pond of 540 m³ (top: 17 m 17 m, bottom: 12 m 12 m, depth: 2.5 m, side slope: 1 : 1) was constructed and lined with brick masonry¹⁵. The actual investment towards pond construction was Rs 51,012 (including Rs 40,000 for lining). The maintenance charges were considered to be Rs 100/year in subsequent years. The conservation measures (bundling) are effective in reducing the run-off to about 2–4% of the total rainfall and soil loss to 0.18–1.5 t/ha/year. Table 2 presents the temporal variation in hydrologic parameters over a period of five years. The run-off volume was more than 550 m³ in four years. Hence, a minimum of 500 m³ can be harvested in a year from a catchment area of 4 ha.

CONSTRAINTS IN THE IMPLEMENTATION OF FARM POND TECHNOLOGY

MARGINAL AND SMALL FARM HOLDINGS

In dryland semi-arid regions, the number of small and marginal farmers is more and their land holdings are less (<2 ha). Most of them depend on their land for livelihood and thus in majority of the cases, these farmers are hesitant to spare even 2–5% of their land for the farm pond. They believe that sufficient rainfall may occur once in 3–4 years and hence using part of their land for farm ponds may not be economical. The initial investment for the construction of individual farm ponds is around Rs 30,000–80,000 per pond without lining. Hence, small and marginal farmers may not come forward to invest in farm ponds. In case of successful farm ponds, farmers must diversify their routine crops to high-value crops for maximizing profits. It needs extra care, investment and also experience in adopting such new crops. If majority of farmers in a locality come forward to invest in the same high value crops, surplus production could result in less market price. Run-off harvesting and supplementary irrigation to high-value crops can overcome the loss incurred towards the land and can reduce the payback period of farm ponds to two years from the normal five years.

EVAPORATION AND SEEPAGE LOSS

In case of farm ponds utilized for supplemental irrigation to kharif crops, evaporation loss from them is less due to lower evaporation during rainy season. In case of rabi crops, retaining farm pond water for life-saving irrigation is one of the major challenges. In order to minimize the evaporation loss, indigenous technical knowledge (ITK) like covering solar panels, asbestos floats, oil cover and shade nets can be explored. Black soils may not need lining for farm ponds, while red soils need lining to retain water.

INVOLVEMENT OF THE GOVERNMENT

At present, the Government is involved in the upliftment of small and marginal farmers by constructing farm ponds and check dams, desilting and renovating existing tanks through schemes like IWMP, NHM, MGNREGS, etc. The subsidies for micro-irrigation are given to farmers through Agriculture and Horticultural Departments under the State and Central Government schemes.

4. CONCLUSION

Farm pond is an option for rainwater harvesting and to provide life-saving irrigation to standing crops when they are exposed to mid-term/terminal drought and also for pre-sowing irrigation in post-rainy crops in rainfed areas. Ponds may be lined in light textured soils, while unlined farm ponds in soils having higher seepage can be utilized to recharge. In a watershed, a series of ponds may be constructed in farm fields and across the water courses/ first- and second-order drainage channels to intercept run-off, reduce peak flow, control erosion and store water for supplemental irrigation and to recharge groundwater. Selection of crops and cropping systems based on profitability and irrigation requirement is needed to efficiently utilize the harvested water. Modern methods of irrigation like drip and sprinklers may be adopted for increasing water-use efficiency.

5. REFERENCE

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