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Constraints in the Adoption of Farm Pond in Drought Regions of Maharashtra

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ABSTRACT

During 2021-22, the beneficiaries and non-beneficiaries of the farm pond on-demand initiative in Maharashtra's Vidarbha and Marathwada regions were analysed and identified the constraints associated with farm pond adoption. Through focus group discussions, observations, and semi-structured interviews with 160 beneficiaries and 160 non-beneficiaries of the farm pond programme, quantitative and qualitative data were gathered. The adoption and discontinuation of agricultural ponds were analysed using the rank-based quotient (RBQ) approach to find barriers and contributing variables. After consulting with subject matter experts, reading pertinent literature, and having a conversation with respondents, a list of constraints divided into four major categories-technical, economic, ecological, and personal constraints-and the perceived significant reason for the discontinuation of the farm pond was noted. Results revealed that the economic constraints were considered the most serious ones, with a mean RBQ value of 88.85. Followed by technological (78.25), ecological (61.82) and personal constraints (58.18). Draining the bore well or well to store water in the farm pond was considered as the most serious perceived reason to discontinue the farm pond with an RBQ value of 44.94, followed by a less productive period of farm pond reported by the respondents with RBQ values 40.38.

INTRODUCTION

India is predominantly an agricultural country, and the country's progress is very much dependent on the development of agriculture. Agriculture depends upon several factors, out of which water plays an important role. More than 60 per cent of the country is vulnerable to drought and 1/3rd of the country's districts will have faced more than four droughts in the past decade by 2030 (NITI Aayog, 2018). The rainfall distribution of Deccan plateau region states like Maharashtra, Karnataka, Tamil Nadu, Telangana and Andhra Pradesh during the monsoon period is mostly erratic and uncertain, coupled with the occurrence of frequent droughts for several days to weeks affecting the productivity of rainfed land drastically (Rao et al., 2015). Contemporary water management innovations are well accepted and integrated into the culture of the dryland farmers as they comprehensively understood the agro-ecological bases for their survival and sustenance in dry land areas (Gupta et al., 2021). Among all deccan plateau states, Maharashtra reported the highest farmers suicide cases *(i.e.)* 16,027 farmers committed suicide between 2015 and 2019 due to drought (crop failure) and debt problems (National Crime Records Burea, 2021), 70 per cent of the primary source of occupation is agriculture in the state, which provides 52.7 per cent employment but contribute only 13.26 per

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cent of state GDP and state share 14 per cent in all India nominal GDP, 2020-21(Maharashtra economic survey, 2020-21). Maharashtra is classified as having medium to moderate water stress in the country with regard to water supply. The southwest monsoon rain shadow area, which receives less rainfall than the western half, includes the Marathwada and Vidarbha regions of Maharashtra (Ratna, 2012). They frequently experience water scarcity, thus effective rainwater gathering and management are required to raise water production and safeguard the region's natural resource base (Deshmukh, 2016). The greatest option for collecting extra rainfall during the rainy season is to build farm ponds, which are then utilised for a variety of reasons in farm operations to preserve rainwater and support both rain-fed agricultural and groundwater-irrigated agriculture (Shah et al., 2021), For the majority of the farming communities in this region, these farm ponds serve as a vital supply of irrigation (Kale, 2017). The state government started a programme called farm ponds on demand (*Magel Tyala Shettale*) in 2016 after realising the demand and significance for farm ponds at the micro level. Therefore, the current study was conducted to identify the constraints related to the adoption and discontinuation of farm ponds in order to offer appropriate sustainable extension interventions to address the challenges farmers confront. This study was performed to understand the status and impact of this programme at the micro or individual level.

METHODOLOGY

For this study, ex post facto research design was used. The Marathwada and Vidarbha areas of Maharashtra were chosen for the current study as they are highly to their drought-affected state. Two districts were selected from each region, and two blocks from each district were selected purposively due to having the highest number of farm ponds. Two villages were selected randomly from every block for the study. For the study, a total of 16 villages were drawn randomly. Twenty respondents from each village, including farm pond beneficiaries and non-beneficiaries, were selected randomly. Around 80 respondents from one district were selected, making a total of 320 respondents from four selected districts constitute the sample. Both quantitative and qualitative data were collected through structured, semi-structured, observation and interactive discussions with key respondents. The Rank Based Quotient (RBQ) approach was used to assemble, tabulate, and evaluate the data that had been obtained. By rating the limitations based on the replies from the respondents and establishing the Rank Based Quotient, the data were quantified (RBQ) (Sabarathanam, 1988).

The RBQ values were calculated. After consultation with subject matter experts, reviewing pertinent literature, and having a conversation with responders, a list of constraints was created. Respondents were then asked to rank each constraints from most severe to least severe Based on the rank that each respondent assigned to each limitation, the Rank Based Quotient (RBQ) was computed. The constraint with the highest RBQ score was considered as the most serious one based on the rankings they gave to each constraint. Rank Based Quotient (RBQ) was calculated as follows:

$$\text{RBQ} = \frac{\sum_{i=1}^{n} fi(n+1-i) * 100}{\text{N*n}}$$

where, fi = the frequency of respondents for the i^{th} rank of the problem

N= the total number of respondents

n= the number of ranks

RESULTS AND DISCUSSION

The significant constraints perceived by the farmers in the study area are depicted in Table 1, along with their RBQ value and based on RBQ value (97.91), The government's financial assistance to the farm pond was insufficient. was given the first rank. It's mainly because the farm pond programme only covers a percentage of the farm pond building costs. This is followed by less life span of farm pond due to less durable material used for construction, insurance not covered, non-availability of timely construction inputs/ materials, and least is suitable for only large farmers due to having insufficient resources were the major technological constraints. The high cost of farm pond digging / JCB cost is a major economic constraint with RBQ value of 95.21 due to the increasing fuel cost of farm machinery similar findings was given by Supe et al., (2017). This is followed by high cost for construction materials, and maintenance of the ponds, non-availability of credit facilities and high cost of labour. These findings align with Malathesh et al., (2009); Dhaka & Dhaka (2016). Low rainfall is the most severe, and inappropriate soil types, slope, and sedimentation are the least severe among agroecological constraints; similar findings were reported by Kumbhare et al., (2012, 2014 & 2020); Ahmed et al., (2015); Chavai & Shinde (2017) among personal constraints, Inadequate family labour (88.75) is the most severe constraint, followed by a shortage of owned resources, decreasing in production due to large areas of productive land going under farm construction, and family or land disputes. The least is a lack of self-confidence to adopt and manage farm ponds. The findings align with Mithun & Bheemappa (2015) & Deshmukh (2016).

Factors associated with discontinuance of farm pond

The responses were taken as ranks from most severe to less severe. The RBQ data of farmers related to the factors associated with the discontinuance of farm ponds are depicted in Table 2, revealing that draining of bore well/ well to store water in farm pond (RBQ value 44.94) was the most serious factor reported by the respondents. A less productive period of the farm pond (RBQ value 40.38) might be due to the less life span of the farm pond due to the less durable material used for construction, followed by inadequate/ low harvest of water or storage (RBQ value 38.94). The least perceived factors in discontinuing the farm pond was low rainfall (RBQ value 29.56).

CONCLUSION

The analysis overwhelmingly showed that farmers face a variety of obstacles when adopting and building a farm pond.

Table 1. Significant constraints faced by the farm pond respondents in Vidarbha and Marathwada region of Maharashtra

S.No.	Constraints	Mean RBQ Value	Rank
	Technological Constraints		
1.	Less life span of farm pond due to less durable material used for construction	95.73	II
2.	Farm pond suitable for only large farmers	92.71	V
3.	Non-availability of inputs/ materials	94.90	IV
4.	Farm pond insurance is not included in programme	95.31	III
5.	The government's financial assistance to the farm pond was insufficient.	97.91	I
	Economic Constraints		
1.	High costs for construction materials and maintenance of the ponds	94.79	II
2.	High cost of farm pond digging / JCB cost	95.21	I
3.	High cost of labour	71.25	IV
4.	Non-availability of credit facilities	94.17	III
	Agroecological Constraints		
1.	Disturbances from farm cattle, pets and wild animals	62.08	IV
2.	Abnormal weather condition	88.75	II
3.	Low rainfall	95.83	I
4.	Inappropriate soil types, slope and sedimentation	54.48	V
5.	High rate of evaporation	83.54	III
	Personal Constraints		
1.	Lack of self-confidence to adopt and manage farm pond	44.27	V
2.	Lack of awareness about farm pond programme	70.21	III
3.	Inadequate family labour	88.75	I
4.	Family or land dispute	51.56	IV
5.	Shortage of owned resources	84.27	II

Table 2. The factors perceived by the respondents which caused the discontinuance of farm pond

S.No.	Factors to discontinue farm pond	Mean RBQ Value	Rank
1.	Adopted only for subsidy assistance	29.88	VII
2.	Draining of Bore well/ well to store water in a farm pond	44.94	1
3.	Less productive period of farm pond	40.38	II
4.	Inadequate/ low harvest of water or storage	38.94	III
5.	Only one-time financial assistance for construction, no further assistance to maintain the farm pond from the government	31.44	V
6.	Low Rainfall	29.56	VIII
7.	Inadequate family labour and non-availability of labour	33.06	IV
8.	Long distance from home	31.25	VI

Recognizing the potential of a water harvesting structure at the level of the individual farmer, the government should strengthen local farm pond users associations at the village level to fully utilise the benefits and prudent use of farm pond water to increase the irrigation potential for more crops per drop. By the means of establishing custom hiring centre at block level to reduce cost of digging and reduce the dependency of hired labour. Encouraging environmentally sound, affordable, and sustainable farm pond with collaboration of state agriculture and its allies, which may overcome current obstacles and lengthen the life of farm ponds.

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