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Farmers' behavioural perspective towards soil and water conservation interventions in Salaiyur watershed from semi-arid region of Tamil Nadu

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ABSTRACT

The soil and water conservation (SWC) interventions could be more cost effective if they are implemented in participatory mode. To understand which SWC interventions are adopted and maintained by farmers themselves is crucial for improving the watershed management programme. Therefore, to understand the post adoption behaviour (continued- adoption. discontinuance, diffusion and infusion) of farmers' regarding different adopted SWC interventions, a field survey study was conducted during 2013 at Salaiyur watershed programme, which concluded in 2003. The results showed that Technology Continue Adoption Indices (TCAIs) of engineering measures like field bunding, check dam, were found more than 62.5%. However, TCAIs of agronomical interventions were ranged from 50 to 93.3%. The same for vegetative barrier and improved crop varieties was 50.0 and 93.8%, respectively. Extent continued adoption, dis-adoption and diffusion of SWC technologies were 79.6, 20.3, and 13.0%, respectively. This showed moderate to high adoption level by farmers concerning different SWC interventions in the Salaiyur watershed. We found that personal, socio-economic, education and psychological factors were key reasons for continued-adoption of interventions.

1. INTRODUCTION

Adoption behaviour is undoubtedly a complex multi-dimensional issue, but not mutually exclusive theoretical frame works have been developed to identify possible factors affecting adoption behavior. Adesina and Zinnah (1993) have defined three main paradigms *viz.,* the economic constraint paradigm, the innovation - diffusion - adoption paradigm and the adopter perception paradigm. While the economic constraint paradigm emphasize the factors that affect the profitability or utility of innovation, the innovation - diffusion - adoption paradigm emphasizes the key role of access to information to understand the process of technology adoption. The adopter perception paradigm in turn emphasize the important role of attitude and perception in the decision making process of the farmers. Rogers (2003) and Singh (1993) termed adoption process as innovation decision process through which an individual passes from first knowledge of an innovation, to forming an attitude towards the innovation, in a decision to adopt or reject the implementation of new technology or idea and to confirmation of this decision, further once adopted there is every chance that the particular technology is being continued with the same specifications or with some technology gap or discontinued completely (Babjee Rao *et al*., 2004; Palanisami and Kumar, 2009), there are some barriers to continue adoption of technology over the time due to improvement or modification in the technology. Thus, adoption of improved technologies will neither improve food security nor reduce poverty if barriers to their continued use are not overcome or not widely diffused (Oladele, 2005). They are bound to face varied circumstances in the wake of adopting a technology and continuing it on longer time period (Valera and Flopino, 1987). Rogers (2003) reported two types of reasons for discontinue using the existing technology in order to adopt a superior one and disenchantment discontinuance, where a decision to discontinue a technology with or without replacement is due to dissatisfaction with its performance. A particular technology comprises a set of components, parameters of a design of package of practices, which are taken into consideration while adoption at farmers' fields for better results. Technology complexity (Singha and Baruah, 2011, Kumar *et al*., 1997), uncertain costs and benefits associated with new technologies affect adoption and diffusion process sometime; there is a gap in technology developed at experimental farm and technology adopted by farmers in their fields. The reason might be non-adoption of the technologies by the farmers as per the recommended specifications, which is called technological gap. Similarly, if a technology is well adopted by farmers and resulted in success, it might attract many neighboring farmers and they in turn would try to emulate the same. In this way, the process by which an innovation spreads within a social system is called technology diffusion.

When the farmers are satisfied with adopted new technology, they are likely to hold on to it but if they feel that it does not meet their needs they will discard it (Bagdi *et al*., 2001; Mondal *et al*., 2015). But in the present times there are so many other factors, apart from meeting of needs that push a farmer to discard a technology. Bagdi *et al*. (2015) found that the end of subsidies and educational programming explained the majority of discontinuance on investigating the discontinuance of farming innovations. This has been proved true in many instances especially in the project of watershed development where the importance has been more on conservation of resources than yield improvement. There is every possible reason for farmers to discontinue a conservation technology unless he has the right attitude and vision towards its long term benefits. A report on the post adoption behavior of farmers with regard to SWC technologies could be much sought for policymakers to form or amend guidelines of watershed programmes. The reasons behind the adoption of a technology or its discontinuance factors responsible for diffusion of a technology and the technological gaps are some of the vital sources for policy makers to narrow down their strategic solutions (Singh *et al*., 2010; Bagdi *et al*., 2013). Hence, it is highly justified to conduct a study on post adoption behavior of farmers towards SWC technologies in order to investigate present status of continued adoption, dis adoption, diffusion, infusion and technological gap and also to assess the reasons behind doing so by the farmers.

2. MATERIALS AND METHODS

Study Area

Saliyur watershed is located in Annur block of Coimbatore district in Tamil Nadu. The geographical location is 77º02'46" to 77º03'55"E longitudes and 11º12' 43" to 11º14'02"N latitudes with an elevation range of 370 to 472 m above mean sea level (MSL). The total area of the watershed is about 513 ha with undulating to moderately sloping (3-15%) topography. The stream order of the watershed is 3rd with a drainage density of 2.72 km km^{-2}. The watershed was implemented by ICAR-Indian Institute of Soil and Water Conservation (IISWC), Research Centre, Udhagamandalam, Tamil Nadu under Integrated Wasteland Development Programme (IWDP) funded by the Ministry of Rural Development, Govt. of India, New Delhi and monitored from 1997 to 2003.

Rainfall and Water Balance

Climate of the region is semi-arid sub-tropical monsoon type. Average annual rainfall is 602 mm with standard deviation of 244 mm and coefficient of variation of 40%. The north-east monsoon accounts for about 33% (259 mm) of the total rainfall followed by 32% (191 mm) during the south-east monsoon and 23% (142 mm) and 2% (10 mm) during summer and winter season, respectively. Evaporation rate is high with an average of about 8 mm day^{-1} from March to May and about 3 to 4 mm day^{-1} between October and December. Almost throughout the year, water deficit or moisture stress is expected and there is a little surplus during the month of October.

Socio-Economic Status

Agriculture and labour accounts for 56 and 38% of the stakeholders' occupation, respectively indicating high dependency of the community on natural resources for their livelihoods. Average landholding size was 1.78 ha, indicating that majority of the farmers fall in small and marginal categories with an average family income of ` 1653 $month^{-1}$.

Selection of Respondents

A list of SWC interventions implemented during watershed development programme was prepared. These interventions were mainly related to engineering and agronomical measures, total nineteen interventions were introduced and recommended to the farmers by ICAR-IISWC, Research Centre, Udhagamandalam, Tamil Nadu, in the watershed, subsequently the beneficiary farmers of watershed who have adopted SWC interventions were selected for the study. The SWC interventions wise inventory was prepared by organizing meeting with the beneficiary farmers, who have adopted a particular technology in the watershed were recorded to prepare inventories of farmers for all interventions adopted by them during watershed development programme. An interview schedule comprising the questions with intentions to address different behavioral patterns of the farmers was prepared, which covered different post adoption scenario like continue adoption and continue adoption with technological gap, discontinuance and diffusion of implemented technologies. For selection of respondent farmers, stratified proportionate random sampling technique was adopted from different inventories or list of farmers. Out of total population of 1314 (314 farmer's family), 50 farmers (n = 50) were chosen as respondents for the study. Data regarding personal, SWC interventions, psychological and post adoption behavior variables were collected through personal interview of the respondents.

Measurement of Post-adoption Behavior of Farmers

To measure the extent of post adoption behavior, variables *viz.,* continue adoption, discontinuance, technological gap, diffusion and infusion, a detailed methodology was developed such as data collection schedules scoring procedure and data analysis with the following developed indices by Bagdi. *et al*., 2018.

Technology continue adoption index

TCAI is the percentage of farmers continuously adopting a technology from the total number of farmers initially adopted that particular technology, which is explained by the given below formula:

$$TCAI = \frac{\text{No. of farmers continue adopted a technology}}{\text{Total no. of farmers initially adopted a technology}} \times 100$$

Discontinuance Index of Technology (DIT)

DIT is the percentage of farmers discontinued a technology from the total number of farmers initially adopted that particular technology, which is explained by the given below formula:

$$DIT = \frac{\text{No. of farmers discontinued a technology}}{\text{Total no. of farmers initially adopted a technology}} \times 100$$

Technology Gap Index (TGI)

This is with reference to the sum of scores that a farmer obtains on continuing a technology with a gap in relation to the total number of farmers adopted that particular technology with technological gap. The scores were given by the experts of respective field by examining the technologies and the magnitude of those technological gaps.

$$TGI = \frac{\sum_{i=1}^{N}\left[\frac{R - A}{R}\right]}{N} \times 100$$

Where, R = Maximum possible score on complete adoption of technology as per the design suitable in the watershed (*i.e.* 10); A = Score obtained by beneficiary farmers on this incomplete adoption of a technology; N = Total number of farmers.

Technology Diffusion Index (TDI)

This index can be interpreted as the percentage of farmers who are involved in diffusing a technology that they adopted from the total number of farmers who initially adopted that particular technology, which is explained by the given below formula:

$$TDI = \frac{\text{No. of farmers who diffused a technology outside}}{\text{Total no. of farmers initially adopted a technology}} \times 100$$

Technology infusion index (TII)

This is the percentage of farmers infused a technology from the total number of respondent farmers who initially adopted a particular technology. In the sense, whether they infused or adopted any inputs or management practices (a particular technology) on their own or through other organisation from outside the watershed consequently, among the total number of selected farmers for infusion study, we collected data on number of farmers who have adopted the technology from outside the watershed was noted down (technology wise) and the TII was calculated accordingly:

$$TII = \frac{\text{No. of farmers who infused a technology outside}}{\text{Total no. of respondent farmers}} \times 100$$

For arriving at overall indices of technologies under different measures at watershed level given formulae were used for the calculation.

Overall Technology Continues Adoption Index (OTCAI)

$$OTCAI = \frac{\text{Total no. of farmers continue adopted a technologies}}{\text{Total no. of farmers initially adopted a technology}} \times 100$$

Overall Dis-adoption Index Technology (ODIT)

$$ODIT = \frac{\text{Total no. of farmers who discontinued the technologies}}{\text{Total no. of farmers initially adopted the technologies}} \times 100$$

Overall Technology Diffusion Index (OTDI)

$$OTDI = \frac{\text{Total no. of farmers involved in diffusing the technologies}}{\text{Total no. of farmers adopted the technologies}} \times 100$$

Overall Technology Infusion Index (OTII)

$$OTII = \frac{\text{Total no. of farmers involved in infusing the technologies}}{\text{Total no. of farmers adopted the technologies}} \times 100$$

3. RESULTS AND DISCUSSION

Technology wise extent of post-adoption behaviour of farmers were studied meticulously for better understanding of post adoption behavioral pattern of farmers regarding different SWC interventions in a watershed. The adopted SWC interventions were mainly grouped into two categories *i.e.* (i) agronomy based SWC interventions, (ii) engineering structure related SWC interventions. The improved crop varieties, improved fodder sorghum, Co-3 Hybrid Napier grass. Diversification to horticulture, afforestation, agroforestry, vegetative barriers and mulching were included under agronomy based SWC measures. The field bunding, improved microsite conditions, check dam (CD), well recharge, dug out ponds, percolations ponds, drip irrigation in sericulture, bore well with hand pump, HDPE lining ponds, etc. were categorized under engineering structure related SWC measures.

Results from Table's 1 and 2 reveals that among 50 respondent (n = 50), 62% of them adopted diversification to horticulture at the time of watershed programme implementation but later 29% farmers discontinued. Equally, 29% farmers adopted with technological gap. With respect to improved fodder sorghum, introduced among 30% farmers' field but only 6% farmer dis-continued remaining all are practicing improved fodder sorghum crop after more than ten years of completed watershed programme. Out of total, 48% of respondents introduced with agro-forestry technique. Out of them, 29% farmers have discontinued and other 71% farmers were continuing the agro-forestry system

Table: 1
Technology matrix of SWC interventions implemented at Salaiyur watershed

Name of technologies	1	2	3	4	5	6	7
Diversification to horticulture	31	22	9	13	9	3	6
Agroforestry	24	17	7	13	4	2	8
Co-3 hybrid napier grass	16	15	1	15	-	9	16
Improved fodder sorghum (INM)	15	14	1	11	3	1	4
Improved crop varieties of rainfed crop	9	8	1	8	-	1	6
Afforestation	5	3	2	3	-	-	6
Vegetative barriers	2	1	1	1	-	-	11
Mulching	2	1	1	1	-	-	4
Sericulture with drip irrigation	2	-	2	-	-	2	4
Well recharge (groundwater)	21	21	-	21	-	-	
Improved microsite conditions	12	8	4	8	-	1	-
Percolations ponds	10	10	-	8	2	-	-
Check dam (CD)	8	5	3	5	-	-	2
Bore well with hand pump for protective irrigation	5	5	-	5	-	-	-
Drip irrigation	4	3	1	2	1	1	25
Field bunding	6	6	-	5	1	2	19
HDPE lining of ponds	3	-	3	-	-	1	2
Dug out ponds	2	2	-	2	-	-	-
Inter cropping	-	-	-	-	-	-	9
Green manure crop	-	-	-	-	-	-	8
Total	177	141	36	121	20	23	130

Note: 1. Number of farmers adopted technology; 2. Number of farmers continued technology; 3. Number of farmers dis-adopted technology;4. Number of farmers completely adopted technology; 5. Number of farmers adopted technology with technological gap; 6. Number of farmers diffused technology; 7. Number of farmers infused technology

Table: 2
Technology matrix of SWC interventions implemented at Salaiyur watershed

Name of technologies	TCAI (%)	DIT (%)	TDI (%)	TII (%)
Diversification to horticulture	71.0	29.0	9.7	6.0
Agroforestry	70.8	29.2	8.3	8.0
Co-3 hybrid napier grass	93.8	6.3	56.3	16.0
Improved fodder sorghum (INM)	93.3	6.7	6.7	4.0
Improved crop varieties of rainfed crop	88.9	11.1	11.1	6.0
Afforestation	60.0	40.0	-	6.0
Vegetative barriers	50.0	50.0	-	11.0
Mulching	50.0	50.0	-	4.0
Sericulture with drip irrigation	-	100	100	4.0
Well recharge (groundwater)	100	-	-	
Improved microsite conditions	66.7	33.3	8.3	
Percolations ponds	100	-	-	-
Check dam (CD)	62.5	37.5	-	2.0
Bore well with hand pump for protective irrigation	100			
Drip irrigation	75.0	25.0	25.0	25.0
Field bunding	100	-	33.3	19.0
HDPE lining of ponds	-	100	33.3	2.0
Dug out ponds	100	-	-	-
Inter cropping	-	-	-	9.0
Green manure crop	-	-	-	8.0

in their fields. A study from Australia, that land-care programme confirmed that well-thought-out and applied government incentives could be very effective in motivating land-users to continue and to utilize new and better conservation practices (Sanders and Dannis, 1999).

Among 50 respondents, 10% farmers adopted SWC with afforestation technique, but after some time 20% farmers have discontinued afforestation. Vegetative barrier introduced on 4% farmer's field were one being continued 50% farmer dropped. One interesting thing was also observed that total 46% farmers diffused various technologies to other farmer's field in to nearby villages and outside of the watershed. Among them, 39% farmers were diffused the Co-3 hybrid napier grass intervention.

In the case of engineering related technologies, field bunding, all the 12% farmers continued as such, among them 83% farmers completely adopted it without any technology gap, 33% farmers diffused bunding to other farmers too. Improved micro site condition was 16% farmers continued, but out of adopted farmers among them 50% farmers dis continued due to labour problem. One farmer diffused the microsite condition to outside watershed village. Among the 8 farmers, who adopted check dam (CD), 63% of them continued and maintained the structures, but 38% check dams were demolished for local rural road construction programme. Among the 50 respondents. 8% farmers adopted drip irrigation for improving irrigation efficiency but after some time one farmer has discontinued it. There were 50% famers infused drip irrigation system from outside watershed after withdrawal of watershed programme. Percolation pond and dug out pond interventions adopted and continued 100% for its efficacy in the ground water recharge and harvested water was used for pisciculture purpose also. On all the 42% farmers' field for well recharge being continued due to augment crop productivity. Watershed farmers informed that 38% farmers infused the field bunding technologies.

In the case of infusion of interventions into the watershed from outside area, it was observed that total 16 technologies, the intercropping and green manuring were infused by farmers on their own or through other agencies into the watershed, which was implemented earlier by an organization through transfer of suitable SWC interventions (Table 1). Out of two infused technologies, intercropping was infused by the higher number of farmers followed by green manuring. The reason behind infusion of intercropping and green manuring were soil moisture conservations, enrichment of soil fertility without extra manures / fertilizers, respectively as reported by the farmers.

The results of indices of different post adoption parameters are presented in Table 2. The results showed that the continued adoption rate of technologies *viz.,* percolations ponds, dugout ponds and bore well with hand pump for protective irrigation, were found fully adopted. The high rate of adoption of these technologies may be attributed to the fact that ground water recharge, water table in wells improved and protective / supplementary irrigation for enhancing crops yields in post rainy season. There were little efforts from the farmers' side for their maintenance since these interventions were implemented in the watershed programme. The DIT of HDPE lining, sericulture with drip irrigation, mulching and vegetative barrier were found 100, 100, 50 and 50%, respectively, which means out of 50 respondent, 6% farmers discontinued HDPE lining and 4% farmers discontinued sericulture with drip irrigation, respectively. They reported the reasons that these technologies required regular maintenance and little higher cost to operate. The lack of information and awareness about SWC interventions contribute to discontinue / non-adoption of intervention as prescribed for integrated watershed progrmme (Bagdi *et al*., 2001).

The TDI of sericulture with drip irrigation, Co-3 hybrid napier grass, field bunding and HDPE lining were found to be 100, 56.3 and 33.3%, respectively which indicates that these interventions were highly acceptable in the farmers' field which may be due to awareness among the farmers about direct / indirect benefits of these interventions in the soil and moisture conservation as well as in improving productivity of lands.

Overall indices of continue-adoption, dis-adoption, diffusion and infusion of implemented SWC interventions in watershed found to be 79.7, 20.3, 13.0 and 6.3%, respectively (Fig.1). It shows comprehensive adoption perspective behaviour pattern of semi-arid region farmers at watershed level. This indicates that moderate to high level of adoption behaviour were found among farmers on various SWC interventions in studied watershed.

Table 3 reveals the reasons for continue adoption of SWC interventions as perceived by the farmers in Salaiyur watershed. The reason mentioned for continue adoption of improved crop varieties of rainfed crops by maximum farmers were higher yield, less water requirement, short duration and also conserve soil moisture. With respect to diversification of horticulture, about 71.0% of farmers mentioned the reasons that family consumption of fruits, possibility of

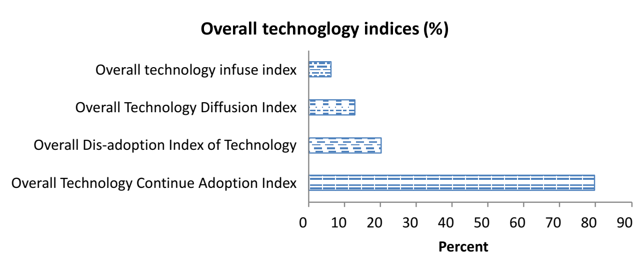

Fig. 1. Overall indices of continued-adoption, dis-adoption, diffusion and infusion of SWC interventions at Salaiyur watershed

Table: 3
Reasons for continued adoption of SWC interventions as perceived by the farmers in Salaiyur watershed

Technology continued	Reasons*	Frequency (n = 50)	Rank#
Improved crop varieties of rainfed crop	Short duration	6	II
	Less water requirement	4	III
	Higher yield	7	II
	Conserve moisture	3	IV
Improved fodder sorghum (INM)	Good fodder yield	12	II
	More palatable to animals	13	I
	Low water requirement	11	III
Co-3 hybrid napier grass	Quick growth	14	I
	More palatable to animals	10	I
	Less wastage of fodder	13	II
	Increased milk yield	11	III
Mulching	Moisture conservation	1	I
	To check soil erosion	1	I
	Checked weed population	1	I
Drip irrigation	Water saving	3	I
	Labour saving	3	I
	More area irrigated	2	II
	Crop yield increased	3	I
	Less weed growth	1	III
	Uniform maturity	2	II
	Harvesting can be done at one time	2	II
Field bunding	Moisture conservation	6	I
	Erosion control	4	II
	Ground water table increased	3	III
	Better crop growth and yield	3	III
Diversification to horticulture	Family consumption	20	I
	Additional income	18	III
	Use of wasteland in productive purpose	16	IV
	Possibility of intercropping	19	II
Afforestation	Use of wasteland in productive purpose	1	I
	Fuel wood	2	II
	Timber purpose	3	I
	Quick growth	2	II
Agroforestry	Timber purpose	15	I
	Leaf litter used as organic manure	9	III
	Additional income	12	II
	Fodder for goats	5	IV
Improved microsite conditions	Better establishment of seedlings	8	I
	Moisture conservation	5	II
Check dam (CD)	Ground water recharge	5	I
	Water table in wells improved	4	II
	Erosion control	3	III
Percolations ponds	Groundwater recharge	10	I
	Collection of runoff water	7	II
Dug out ponds	Water used for pisciculture	1	II
	Water table in wells improved	2	I
Well recharge (groundwater)	Ground water recharge	21	I
	Some place water used of drinking purpose	6	
Vegetative barriers	Physical protection from animals	1	I
	Erosion control	1	I
	Act as field boundaries	1	I
	Fibre extraction from agave	1	I
Bore well with hand pump	Protective irrigation for seedlings	5	I

**Reasons were identified by the farmers based on their own experiences; #Ranks derived based on the percentage of farmers quoted reasons*

intercropping, additional income and use of waste land in productive purpose. Loganandhan *et al*. (2015) reported that only when SWC measures are fully adopted, their execution is sustained and fully integrated in the household's farming system. Similarly, 100% of the farmers reported the reasons like ground water recharge, improved water table in wells, collection of runoff water and water used for pisciculture for continue adoption of percolations ponds and dug out ponds. With reference to diversification to horticulture related technologies, there is a much need to sensitize the farmers about the long-term benefits of fruit tree. Further, in order to establish these trees in the degraded lands and community land, community / social participation is very essential. Hence, the approach need to be individual oriented in case of fruit trees or border plantations, however plantation of multipurpose trees in common land community oriented approach very much necessary.

The reasons for dis-continuing the adopted SWC interventions as perceived by farmers in the studied watershed are presented in the Table 4. Irrigation water scarcity, lack of maintenance and pest and disease incidents by most of farmers for dis continuing diversification of horticulture activity. Similarly, afforestation and agroforestry intervention was discontinued by majority of the farmers' groups due to animal menace and shade effect to main agriculture crop. With respect to HDPE sheet lining of ponds all the farmers dis continued due to HDPE sheet damaged and water directly stored in cement tanks and in abandoned well instead of pond. Similarly, sericulture with drip irrigation was discontinued due to frequent failure of rainfall, pest and disease incident followed by yield loss. Mishra and Tripathi (2013) also reported that farmers were interested in receiving free inputs and reverted to their own practices once the sponsored programme was withdrawn.

4. CONCLUSIONS

This study enlightened the post adoption behavior of farmers with respect to SWC interventions in Salaiyur watershed. From the study it may be concluded that

Table: 4
Reasons for dis-adoption of SWC interventions perceived by the farmers in Salaiyur watershed

Interventions	Reasons	Frequency (n= 50)	Rank	Suggestions
Improved crop varieties of rainfed crop	Non availability of seeds in time	1	I	Agricultural department should arrange for timely supply of seeds
	Pest and disease incidents more in cotton and ground nut	1	I	Awareness creation and training needed on plant protection aspects
	Uneven distribution of rainfall	1	I	Construction of more water harvesting structures
Improved fodder sorghum (INM)	Do not have cattle	1	I	Nil
Co-3 hybrid napier grass	Water scarcity	1	I	Construction of more water harvesting structures
Mulching	Termite problem	1	I	Lack of knowledge and hence awareness may be created
Drip irrigation	Irrigation water scarcity	1	I	Existing bore well may be deepened
Diversification to horticulture	Irrigation water scarcity	5	I	Construction of more water harvesting structures
	Pest and disease incidents	4	II	Plant protection tools required with subsidies
	Poor fruit bearing	2	III	Region specific variety should be supply
	Peacock problem	4	II	birds scaring instruments needed
	Lack of maintenance	5	I	Training required for maintenance
Afforestation	Irrigation water scarcity	2	I	Construction of more water harvesting structures
	Animal menace	2	I	Semi *pacca* fencing may be provided
Agroforestry	Shade effect to main crop	4	II	Proper training and pruning of trees
	Irrigation water scarcity	3	III	Construction of more water harvesting structures
	Lack of maintenance	5	I	Tree guards may be supplied
Improved microsite conditions	Labour problem	4	I	Mechanization is more costly, hence
	Lack of time	3	II	subsidy may be given
HDPE lining of ponds	HDPE sheet damaged	3	I	HDPE sheet may be given at subsidized
	Water directly stored in abandoned well instead of pond	1	II	rate
	Water directly stored in cemented tank instead of pond	1	II	
Check dam (CD)	Due to road construction it was demolished	3	I	Nil
Vegetative barriers	Animal damage	1	I	Social awareness may be created on
	Dried due to water scarcity	1	I	protection
Sericulture with drip irrigation	Pest and disease incidents	2	I	Training required on cultivation of
	Frequent rainfall failure and yield loss	1	II	mulberry as it is a new venture for this locality

engineering measures were found to be accepted and continued by the farmers to a greater extent with minimum technological gaps. In case of agronomical measures, the technological gaps were at considerable level, but continue adoption percentage and diffusion rate were also found to be at significant level.

Engineering measures are long lasting with much less efforts required from the farmers' side for their maintenance. This feature may be well employed to strengthen the skill of farmers for additional better usage. Farmers have to be trained on skills of maintaining these technologies. particularly in case of farm pond, skills pertaining to drip irrigation repair and maintenance of main and lateral lines, percolation ponds and dug out ponds, etc. shall be imparted to the needy farmers at appropriate intervals. In the case of HDPE lining of ponds, the discontinuance rate was much higher.

In the case of agronomical measures, the interventions are found to be simple and easy to adopt, as per the need, at that specific period of time. Further, there is an ample scope for farmers to try different combinations like ease of use of inputs, labor, market preference, etc.

This study was also showed that overall adoption level of farmers regarding various SWC interventions in the Salaiyur watershed was moderate to high, which require improving to maximum possible level for a sustainable management of any watershed programme in the semi-arid regions.

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