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Farmers Perception, Acceptance and Implementation Factor Towards Soil and Water Conservation Measures

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Abstract:- Soil and water are often used and managed inappropriately. Soil and water conservation at the watershed level can effectively reduce the soil erosion and also improves the productivity of the land. The paper aims to investigate the farmers' perceptions, acceptance and implementation factors towards soil and water conservation measures (SWCM's) in Vedal watershed. Questionnaire survey is carried out with 112 farmers using stratified random sampling technique. Nearly 67% of people were aware about the SWCM's. Lack of money, labour and size of the land holding are the major factors influence the implementation of SWCM's on the field. The study revealed that in order to improve and for better implementation of the conservation measure there is a need to consider the peoples' perception on conservation measures in restoring the degraded ecosystem to ensure environmental and socio-economic sustainability in the study area.

Keywords:- Social Perception; Soil and Water Conservation Measures; Environmental and Socio-economic Sustainability.

I. INTRODUCTION

"Watershed" is an area of land that supplies water through surface or subsurface flow in to a specific water body – a stream, lake, river or ocean. The land and water use, and its management practices decide the flow characteristics of watershed and its relationship with the watershed. Degradation of watershed refers the long-term degradation of quantity and quality of soil and water in a watershed (Ashoori et al. 2016). Watershed management is defined as the process of creating and implementing plans, programs, and projects to sustain and enhance watershed functions that affect the plant, animal, and human communities within a watershed boundary. Watershed management includes the sensible use of natural resource with active participation of institutions, organization, peoples and having a consciousness with the ecosystem.

As a strategy for the sustainable development of dry land areas and the comprehensive assessment of Watershed Program in India Integrated Watershed Management Programme was implemented in India (IWMP) (Garga and Sharma 2016). IWMP has to be implemented under common guidelines on watershed development, 2008. IWMP is implemented on watershed basis with the objectives of optimum utilization of land and water resources for maximizing benefits to the farmers (Ekambaram and Phil 2015).

Mango et al. (2017) have done a research on the awareness among the farmers to analyse the key factors which influences the implementation on SWCM's and found that in order to improve land productivity there is a need to consider the age of the household head, farmer group membership, education, awareness level, size of the land holdings, land to man ratio. Moges and Taye (2017) investigated the decisive factors towards the use and spend in SWCM's by the farmers. The results of the study reveals that level of educational of the respondents, access to trainings and the contact with the extension agent, land holdings size, land ownership are the major positive factor influences the adoption and implementation of SWCM's. On the other side, age of the respondents, distance of farm land from the homestead have a negative significant. Singh and Prakash (2010) conducted a study on effectiveness of the watershed development project implemented in Manipur. The result shows that the watershed development programme made a land use system favorable for horticultural crops. Also, it increases the employment opportunities and economic status.

The objective of the study detailed in this paper is to investigate the farmers' knowledge and factors influencing the acceptance and implementation of SCMS's, and evaluating the impact of SWCM's implemented by IWMP on socio-economic status of farmers.

II. DATA COLLECTION AND METHODOLOGY

A. Description of Study Area

The study is conducted in Vedal watershed located in Walajabad Block of Kanchipuram District, Tamilnadu, India. The Vedal Watershed consists of four revenue villages namely Vedal, Seeyati, Karai, Poondithangal. The Figure 1 shows the index map of the vedal watershed. The Vedal watershed has an area of 704.235 ha and the annual rainfall is 1252.10 mm. Agricultural land in the village have been left fallow for two

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decades because of less rainfall and all the wells in the watershed area are almost dry in the summer season. Though this village is endowed with abundant rainfall yet it is beyond one's comprehension, why the village has so much of lands under the category of other fallow's implied that, there is no proper arrangement to conserve rainwater. The drainage pattern in general is dendritic and radial. This watershed is having an average slope of 3.6%. Soil type is sandy loam and it is cohesion less in nature. Type of erosion occurred is of Sheet.

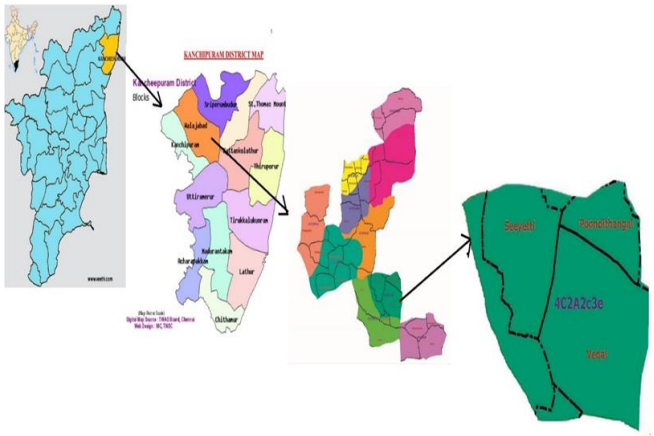

Figure 1 Index Map of Vedal Watershed

Figure 2 Percolation Pond

Figure 3 Cattle Pond

Figure 4 Village Pond

Figure 5 Sunken Pond

Figure 6 Check Dam

Figure 7 Poondithangal Tank

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To conserve soil and water some conservation works were carried out by IWMP, like construction of percolation tank (Figure 2), cattle pond (Figure 3), village pond (Figure 4), sunken pond (Figure 5), check dam (Figure 6) and tank (Figure 7).

B. Data Collection

The primary data on SWCM's were collected through Participatory Rural Appraisal (PRA) tools such as questionnaire survey, key informant interview, focus group discussion and transect walk. For collecting appropriate data using PRA tools, sampling techniques is an important process. The different sampling methods involved in this study are cluster sampling, simple random sampling and deliberate sampling. In the stratified random sampling technique, the population is stratified in to a number of non-overlapping subpopulation or strata and sample items are selected from each stratum. If the items selected from each stratum is based on simple random sampling the entire procedure is together called as stratified random sampling. Cluster sampling involves grouping the population and then selecting the groups or the clusters rather than individual elements for inclusion in the sample. In order to practices focus group discussion cluster sampling method is used. In this study farmers are grouped together based upon the landholding size and gender criteria. The deliberate sampling method involves purposive or deliberate selection of particular unit of the universe. Here purposively the particular officials (i.e., those whose involved in implementation conservation measures) are selected. Using Boyd's formula, the sampling size of the Vedal watershed was determined and resulting that 60 respondents from Vedal village, 30 respondents from Seeyati village, 12 resondents from Karai village and 10 respondents from Poondithangal villages were chosen for questionnaire survey. Structured questionnaires were used to collect the data on demographic and socio-economic characteristics of the respondents, perception about the environmental problem, SWCM's, acceptance and implementation factors towards water conservation and erosion reduction measures and satisfaction level of work done by IWMP were also collected. A transect walk across the village enabled the acquisition of the necessary information on the implemented conservation practices. The secondary data was collected from the various reports published by Watershed development programme such as Preliminary Project Report (PPR) and Detailed Project Reports (DPR).

C. Data Analysis

The questionnaire survey data were analysed using Statistical Package for the Social Sciences (SPSS) software. It includes simple descriptive analysis which is used to compute the percentages and frequencies for some socioeconomic variables. The multi criteria decision aid tool assists with decision making in the presence of multiple criteria especially with reference to choose, ranking and sorting of options. The higher scored choices represented the most preferred by the respondents. Chi- Square test and Fisher's Exact test, were used to examine possible relationships among different parameters and the influence of different factors on adoption. Paired t-test were used to examine the change in socioeconomic status before and after implementing IWMP.

III. RESULTS AND DISCUSSION

A. Respondent Characteristics

The study found that age distribution of farmers in the study area varying from 20 to >81 years. Around 28.6% were in the age group of 41- 60% years. Whereas 8% were above 81 years, 52.7% were those with age groups ranging from 20 to 40. Around 64.3% of farmers in Vedal watershed were involved in cultivation, while 21.4% of farmers are working as an agricultural labour, followed by 10.7% are doing business and 3.6% of people are working as non-agricultural labour. The respondent's income lies between Rs. 5,000 to Rs. 10,000. From that results, it reveals that their income only satisfies their basic necessities of their daily life.

B. Land Characteristics

44.4% of farmers are having an average of 1-2 acre as the land-holing size. 13.9% of farmers are having more than 5 acres as their landholdings. 69.8% of famers are practicing the irrigated agriculture, out of which 70.1 % respondents are using tank is the major source for the irrigation.

C. Perception and Reason for Non-Adoption of SWCM's

73.96% of respondents are aware about the importance of soil and water conservation measures. During summer season the Vedal watershed is facing severe water scarcity problem. During that period 45.2% respondents reported that they don't have water even for cultivation followed by household activities and drinking. In the case of soil conservation measures 90.63% farmers doesn't experienced any soil erosion in their field. So, none of them adopted any soil conservation measures in their farm. In the case of water conservation measures due to lack of labour and money none of them adopted any conservation measures in their farm.

D. Factors Influencing Adoption of SWCM'S

The factors influencing the adoption of conservation measures are related with personal, institutional and socio-economic characteristics. The Table 1 shows the relationship between the various characteristics of the respondents.

TABLE I. FACTORS INFLUENCING ADOPTION

Variable	Significant Value	Standard Significant value	Test used	Hypothesis	Relationship between variables
Age	0.015	0.05	Chi-Square	Accept	Relationship exist
Education	0.310	0.05	Chi-Square	Reject	No Relationship
Household Gender	0.186	0.05	Chi-Square	Reject	No Relationship
Family Size	0.249	0.05	Chi-Square	Reject	No Relationship
Landholding Size	0.020	0.05	Fishers Exact	Accept	Relationship exist
Awareness about conservation measure	0.001	0.05	Chi-Square	Accept	Relationship exist
Training attended	0.361	0.05	Fishers Exact	Reject	No Relationship
Monthly income	0.662	0.05	Chi-Square	Reject	No Relationship

From the Table I shows that age, landholding size, and awareness about the conservation measures shows the positive relationship, and education, household gender, family size, monthly income are showing the negative relationship between the adoption of conservation measures.

a. Age of the respondents

There were five groups among the respondents: 20-30 years' age people were considered as young people, 31-60 years' were considered as middle age people and more than 61 years' were considered as old people. Majority of the farmers are belonging to the young age and middle aged group which is an indication that there is a sufficiently large labour force. Table II shows that, the relationship between age and SCWM adoption among farmers was statistically significant (0.015) at $p < 0.05$ From the Figure 8 shows that the adoption among the middle age group was much higher than the other aged group respondents. This showed that, increase in number of years one lives, is accompanied by decrease in energy/strength and in the case of young age people they don't have any experience in understanding on the importance of SCWM and also, they are having some other option to lead their life than the agricultural practices.

TABLE II. INFLUENCE OF AGE ON SWCM ADOPTION

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	12.016[a]	4	.017	.015		
Likelihood Ratio	12.477	4	.014	.018		
Fisher's Exact Test	11.873			.017		
Linear-by-Linear Association	1.862[b]	1	.172	.191	.099	.024
N of Valid Cases	112					

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 4.18.

b. The standardized statistic is 1.365.

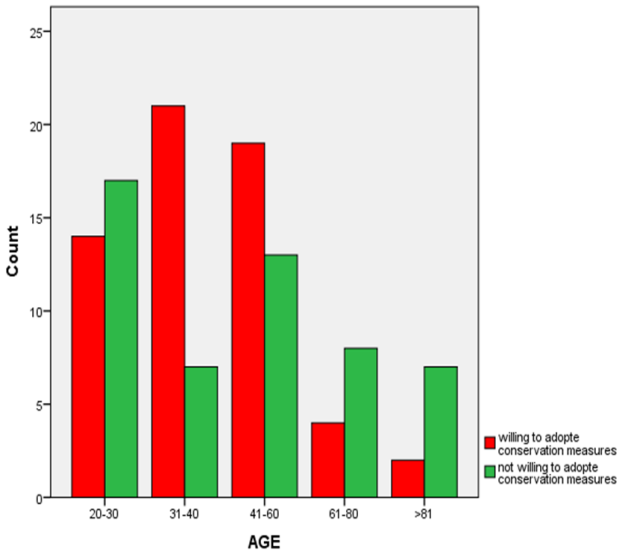

Figure 8 Adoption level with respect to age

TABLE III. INFLUENCES OF LANDHOLDING SIZE ON SWCM ADOPTION

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	9.968[a]	3	.019	.018		
Likelihood Ratio	10.285	3	.016	.021		
Fisher's Exact Test	9.764			.020		
Linear-by-Linear Association	6.937[b]	1	.008	.010	.006	.003
N of Valid Cases	72					

a. 3 cells (37.5%) have expected count less than 5. The minimum expected count is 4.25.

b. The standardized statistic is -2.634.

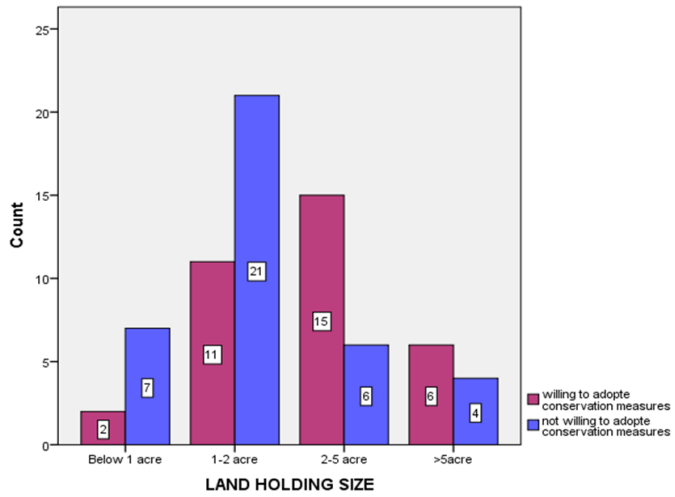

Figure 9 Adoption level with respect to landholding size

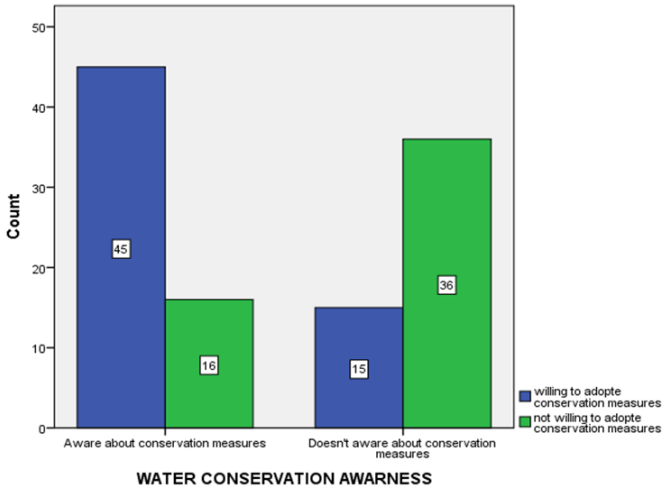

Figure 10 Adoption level with respect to awareness

b. Landholding size

The Table III shows the landholding size was related to adoption of SWCM. There was variation in adoption of SWCM across respondents with different farm size in the study area. Adoption of SWCM increased as farm size increased which is shown in the Figure 5.11. Increasing trend of adoption with increasing farm size showed that, a large farm size gives the farmer more flexibility in using various technologies than it is for farmers having small land size. The relationship between farm size and adoption of SWCM was positive and statistically significant (0.020) at $p < 0.05$.

c. Awareness about the conservation measures

Awareness about the conservation factor which have shown the positive significant relationship with adoption of SWCM (0.001) at $p < 0.05$ 51 (Table IV). This implies that, awareness to SWCM was associated with increase in the adoption of SWCM. The results show that, among farmers who are aware about the conservation measures are ready to adopt the SCWM rather than those who doesn't have the awareness which is shown in the Figure 10. The awareness level reveals the importance level of controlling soil erosion and conserving water.

TABLE IV. INFLUENCE OF AWARENESS ON SWCM ADOPTION

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	21.975[a]	1	.000	.000	.000	
Continuity Correction[b]	20.227	1	.000			
Likelihood Ratio	22.698	1	.000	.000	.000	
Fisher's Exact Test				.000	.000	
Linear-by-Linear Association	21.778[c]	1	.000	.000	.000	.000
N of Valid Cases	112					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 23.68.

b. Computed only for a 2x2 table

c. The standardized statistic is 4.667.

E. Socio-Economic Impact

It was observed that only 42.86% (Figure 11) respondents reported that due to implementation of IWMP farmers are benefited in the Vedal watershed. The farmers got only financial incentive from the implementation agency (IWMP) are considered as a benefited farmer. In order know about the change in income status a comparison was made by use of a paired sample t-test. From the Table V result show that respondent's income was increased a mean amount by 1.5. change in income status before and before implementation of programme in shown in Figure 11.

TABLE V. T-TEST SHOWING THE CHANGES IN INCOME STATUS

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Income before IWMP	2.50	12	1.000	.289
	Income after IWMP	4.0000	12	.00000	.00000

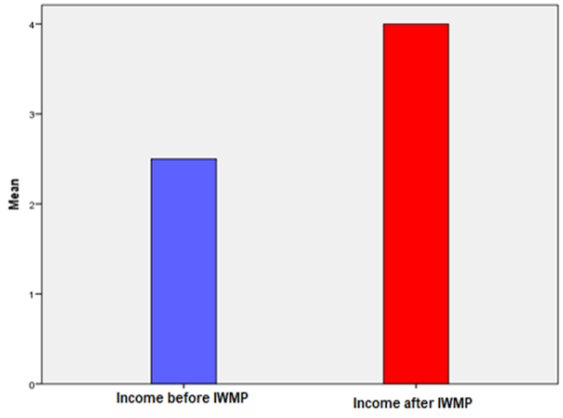

Figure 11 Change in income status before and after IWMP implementation

IV. DISCUSSIONS

The farmers present in the villages were aware about the soil erosion and water stress problem. Since the topography of the watershed is flat. The effect of soil erosion is insignificant, thus soil conservation measures are not required. In the case of water stress problem, lack of money and labour are the major factors influence the adoption of conservation measures on their own filed. Due to existence of communication gap between the programme and local community the places selected for conservation measures are inappropriate so that it failed to do its purposes. Adoption of soil and water conservation measures is significantly influenced by age, land holding size and awareness about conservation measures. Some of the factors such as education, household gender, family size, monthly income did not have significant influence on adoption of SCWM. The study therefore concludes that in order to improve and better implementation of the conservation measure there is a need to consider the people' perception on conservation measures in restoring the degraded ecosystem to ensure environmental and socio-economic sustainability in the study area.

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