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FARMER'S SUGGESTIONS TO IMPROVE THE TANK SYSTEMS PERFORMANCE WITH SPECIAL REFERENCE TO MADURAI DISTRICT

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ABSTRACT

This study clearly shows that well water depleted year by year due to poor maintenance in non-modernized tank of farmers. The present study clearly indicates almost all the respondents are highly preferred clearing of supply channel. Once the supply channel is damaged, tanks could not get water. Highest source of revenue was preferred by the respondents to the cutting tree irrespective of the group of respondents. The water availability is more in modernized tank system. This paper discuss the how tank modernization can help farmers to increase irrigation utility. The primary data were collected from the farmers in Madurai District and analyzed with suitable statistical data.

JEL CODE

Q10, Q15, Q18, Q19.

KEYWORDS

Agriculture Growth, Funds Utilization, Irrigation, Tank System.

I. INTRODUCTION

Low agricultural growth is a concern for policymakers as some two-thirds of India's people depend on rural employment for a living. Current agricultural practices are neither economically nor environmentally sustainable and India's yields for many agricultural commodities are low. Poorly maintained irrigation systems and almost universal lack of good extension services are among the factors responsible. Farmers' access to markets is hampered by poor roads, rudimentary market infrastructure, and excessive regulation.

The earlier studies clearly observed tank irrigation is the main viable source to meet the irrigation demands in future (Karmegam Gomathinayagam.,1999). Modernizations of tanks with farmers' participation have to be practiced to derive maximum benefit (Rajagobal.,2001). It shows that irrigation development has reduced poverty. Tank modernization enabled the farmers to go for an additional crop.

The water availability is more in modernized tank system. This paper analysis how tank modernization with farmers participation to tank system can help farmers to increase irrigation utility. The irrigation is an important factor in determining rates of poverty reduction (Gargi Parsai.,2009) The significant poverty reduction in many parts of India is attributed to the availability of irrigation, which not only boosted agricultural production but also made possible the adoption of modern farming technology – seeds fertilizers and pesticides – that further reduced poverty.

II. METHODOLOGY

2.1. STATEMENT OF THE PROBLEM

The Irrigation System can be divided into two types i.e. System and Non-System Tank. The awareness to do Tank Modernization with the help of Water User's Organization has been popular at present. As a Researcher is interested to suggest the needed policy interventions in improving the Tank performance based on farmers' opinion

2.2. OBJECTIVES OF THE STUDY

To suggest the needed policy interventions in improving the Tank performance

2.3. RESEARCH HYPOTHESIS

Ho: The types of system tanks do not have significant association with sluice, surplus weir, Supply Channel, Field Channel, Irrigation Practice, Tank, and Damage Opinion.

Ho: The types of non system tanks do not have significant association with sluice, surplus weir, Supply Channel, Field Channel, Irrigation, Practice, and Tank Damage Opinion.

2.4. RESEARCH METHODOLOGY

In the present study, both primary and secondary sources of data were collected for analysis. Primary data were collected from farmers to know family details, religion, type of house, asset position, farm size, irrigation particulars, availability of water for season, well water depth, condition of irrigation structure, sources of revenue generation, farmers suggestion in view to improve tank system maintenance, cost of cultivation, yield and income etc.

Secondary data were collected with regard to gather basic statistics, total number of irrigation tanks, sources of irrigation, net area irrigated, rainfall and cultivation particulars. The Secondary data were collected from VAO's of sample farmers' tank, taluk office, PWD office, Department of Statistics and Economics.

2.5. SELECTION OF TANKS AND FARMERS

In Madurai District, World bank was funded to modernize system tanks in 1985-1988. The EEC has funded to the State Government through PWD to modernize Non System Tanks during 1990-1992. This study try to find out which tank system of modernization is more beneficial to farming community. Both system and non-system tanks are available in Madurai district. In Madurai district, agriculture is the main occupation. The system tanks are more concentrated in Vadipatti block where Non system tanks are also available. Non system tanks are concentrated in Thirumangalam block. An economic study of farmers Participation in tank irrigation water management and comprising system and non system tanks have not been studied so far in Madurai District. So, it requires an in depth analysis and exploration of the farmers participation in tank irrigation water management.

Madurai district is selected for the study. In Madurai district, the total number of tanks are 292 (greater than 40 ha) out of which 17 tanks are selected for the study covering six system tanks and eleven non system tanks. Out of six tanks, three tanks were chosen from modernized and three tanks from non modernized. In non system tanks, six tanks were chosen from modernized and five tanks were chosen from non modernized. The above tanks were selected on the basis of concentration of tanks in two blocks of Madurai namely Vadipatti and Thirumangalam. In Vadipatti, system tanks are more in numbers. In Thirumangalam, Non

system tanks are more in numbers. Three tanks from Madurai block were also selected which are very near to the selected blocks. Hence the selection of tanks is purposive.

Purposive sampling is followed in the selection of farmers also. A total of 227 farmers were selected from both system and Non system tanks. 147 farmers were selected from non system tanks in view of large numbers of non system tanks in the study areas. In view of small numbers of system tanks, only 80 farmers were selected from system tanks. Equal representation is given for head, middle and tail reach areas as well as to marginal, small and large farmers.

2.6. STATISTICAL TOOLS AND TECHNIQUES USED FOR THE STUDY

The data collected were analyzed through descriptive statistics like percentage mean and standard deviation to know the condition of tank structure, well water depth, renovation work required, sources of revenue generation, mobilization of funds and other details related tanks opinion and suggestions in connection with tanks. Statistical tools such as Chi-square, t-test, one way ANOVA were used to analyze and interpret the data for get results.

T test was used to test for significant difference between two group means.

III. REVIEW OF LITERATURE

Karmegam Gomathinayagam (1999) revealed that the lining of canals and On Development works With Farmer's cooperative resulted in the reduction of travel time of water to reach tail end area. The reduction in time ranged from 20 to 50%. They also found that the water availability in tanks, in terms of days of storage have increased ranging 20 to 40 days. This enabled the farmers to go for an additional crop and added employment days for laborers. It stated that it has proved in the monitoring and Evaluation study conducted by Anna University taking in to consideration of 5 tanks, that the yield of paddy, during the pre-project period was 3797 kg/ha and it was increased to 4741 kg/ha in post project and they concluded that by improving efficiency of irrigation system with farmers involvement will rise the return per unit of water.

Rajagopal (2001) in his study titled "Water Management in Agriculture, Role of Institutions (Both Farmers Organization and Irrigation Bureaucracy) in a South Indian canal system. It deals with the role of farmers organizations especially traditional and their interaction with irrigation bureaucracy in performing different task related to Water Management viz appropriation of water from the main canal, distribution of the supply among farmers in a village, maintenance of the irrigation structure, arbitration of conflict arising out of these task and overall impact on crop production.

Bhattarai and Narayanamoorthi (2003) have empirically shown that in irrigation and rural literacy are the two most important factors for agricultural growth in India. Ranade (2003) in his study "Future Trends in water resource development in India to strengthen rural economy through Development of Irrigated Agriculture",

Kei Kajisa, Palanisamy and Takeshi Sakurai (August 2004) have examined the factors underlying decline in the collective management of tank irrigation system and the impact of those declines on rise yield and house hold income / consumption. They finds from the study, declines in the collective management of tank irrigation and their impact on income distribution and poverty in Tamil Nadu.

Eabenson (2005) concluded that it is imperative to recognize that the water shed development programme will not be effective unless the affected people understand the rationale of the works and changes in land use to be brought about in their areas and accept the changes and co-operate in maintaining the facilities.

Ashok Gulati, Ruth Meinzen Dick and Raju (2005) examined the nature and scope of the problems of large-scale surface Irrigation in India, the authors of Institutional reforms in Indian Irrigation focus on options for Institutional reforms and the outcomes of several pilot reform programs. They use qualitative and quantitative techniques to examine actual experience with irrigation reforms in India.

Shivashankar (2005) in his study found that we are emptying our most precious treasure of water so soon and are thus destroying our Eco-systems. Let us pause a bit and readjust our life-styles. This indeed, is the urgent task of all the "Resource-Management Agenda" for the whole of humanity.

Shivappa in his study (2006) examined the importance, impact and progress of Irrigation in Karnataka. The study is based on both Secondary and Primary data. Primary data has been collected by personal interviews from 360 farmers selected randomly in De ranger and Chitrudunga Districts in 2005-2006 during survey method. The analysis of data revealed that irrigation changed the cropping pattern infavour of high valued crops such as sugarcane. The small and marginal farmers income increased by 341% and that of the medium and large farmers by 364% per acre in Devangore block in Devangore District. In Hiriyur taluk in Chitradurga district the marginal and small farmers and medium and larger farmers earned 348% and 365% more income per acre respectively. Farm employment increased by 120% to 177% the yield of crop has increased by 100% to 380% over 50% of the sample farmers raised two crops while some enterprising farmers also cultivated three crops.

Lakshmanan Poucheppa Raju and Sendhil (2006) in their study "Impact of water shed development on crop productivity and income distribution, An economic Analysis, observed that the difference in crop productivity and changes in costs and returns of cultivating paddy and groundnut crops in water shed treated areas (WTA) and Non Treated Areas (WTA). It also describes the income distribution and inequalities existing among the farmers in WTA and NTA. The authors have evaluated the benefits of watershed development over non watershed area and this may help the policymakers for better implementation of watershed development programs in other dry land areas.

IV. RESULTS AND DISCUSSION

Table 1 showed the conditions of tank structure. 94.7 percent of the respondents reported that the tank bund was good. In the System category, all the respondents in the modernization group and non modernized group felt the tank bund was good. In the non system category, all the respondents of modernized group and 82.1 percent of the non modernized group were satisfied with the condition of the tank bund.

Majority of the respondents (69.2 percent) were satisfied with the conditions of tank sluice. In the system category, 69 percent of the modernized group and all the respondents belonging to the non modernized group felt well with sluice conditions. In the non system category, 61.2 percent of them felt good. Among them, most of the modernized group (67.5 percent) and the non modernized group of respondents (53.7 percent) were satisfied in this regard.

TABLE -1: OPINION ABOUT THE CONDITIONS OF TANK STRUCTURE

Conditions of Irrigation Structure		Type of Tank												Table Total	
		System				Group Total		Non-system				Group Total		No.	%
		Modernised		Non-Modernised		No.	%	Modernised		Non-Modernised		No.	%		
		No.	%	No.	%			No.	%	No.	%				
Tank Bund	Bad	-	-	-	-	-	-	-	-	12	17.9	12	8.2	12	5.3
	Good	42	100.0	38	100.0	80	100.0	80	100.0	55	82.1	135	91.8	215	94.7
Sluice	Bad	13	31.0	-	-	13	16.3	26	32.5	31	46.3	57	38.8	70	30.8
	Good	29	69.0	38	100.0	67	83.8	54	67.5	36	53.7	90	61.2	157	69.2
Surplus Weir	Bad	14	33.3	-	-	14	17.5	13	16.3	49	73.1	62	42.2	76	33.5
	Good	28	66.7	38	100.0	66	82.5	67	83.8	18	26.9	85	57.8	151	66.5
Supply Channel	Bad	13	31.0	38	100.0	51	63.7	25	31.3	58	86.6	83	56.5	134	59.0
	Good	29	69.0	-	-	29	36.3	55	68.8	9	13.4	64	43.5	93	41.0
Field Channel	Bad	17	40.5	18	47.4	35	43.8	26	32.5	48	71.6	74	50.3	109	48.0
	Good	25	59.5	20	52.6	45	56.3	54	67.5	19	28.4	73	49.7	118	52.0
Table Total		42	100.0	38	100.0	80	100.0	80	100.0	67	100.0	147	100.0	227	100.0

Source: Compiled from respondents schedule

Majority of the respondents (66.5 percent) were satisfied with the conditions of surplus weir. In the system category, 66.7 percent of them of the modernized group and all the respondents belonging to the non modernized group felt good with tank structure. In the non system category, 57.8 percent of them felt good. Majority of the respondents (59 percent) were not satisfied with the conditions of supply channel. In the system category, 69 percent of the modernized group felt well with irrigation conditions and all the respondents belonging to the non modernized group felt bad with these conditions. In the non system category, 59 percent of them felt bad. Most of the modernized group (68.8 percent) of respondents was satisfied in this regard and most of the non modernized group of respondents (86.6 percent) was felt bad with the conditions of surplus weir.

Regarding the field channel, majority of the respondents (52 percent) were satisfied with the conditions. In the system category, 59.5 percent of the modernized group and 52.6 percent of the respondents belonging to the non modernized group felt well with field channel. In the non system category, 52 percent of them felt good. Most of the modernized group (67.5 percent) was satisfied in this regard and most of the non modernized group of respondents (71.6 percent) was felt bad with the conditions of the surplus weir.

TABLE -2: OPINION OF RESPONDENTS ON THE DAMAGE OF TANK

Tank Damage Opinion		Type of Tank												Table Total	
		System				Group Total		Non-system				Group Total		No.	%
		Modernised		Non-Modernised		No.	%	Modernised		Non-Modernised		No.	%		
		No.	%	No.	%			No.	%	No.	%				
Encroachment	4	9.5	10	26.3	14	17.5	7	8.8	6	9.0	13	8.8	27	11.9	
Siltation/Chocking	1	2.4	9	23.7	10	12.5	38	47.5	16	23.9	54	36.7	64	28.2	
Road	29	69.0	19	50.0	48	60.0	23	28.7	35	52.2	58	39.5	106	46.7	
Urbanization	8	19.0	-	-	8	10.0	12	15.0	10	14.9	22	15.0	30	13.2	
Table Total		42	100.0	38	100.0	80	100.0	80	100.0	67	100.0	147	100.0	227	100.0

Table 2 revealed the opinion of respondents on the damage of tanks. Among the total respondents, 46.7 percent of the respondents opined that Construction of roads was the major reason for the damage of tanks.

In the system category, Most of the modernized (69 percent) group of respondents revealed that construction of roads was the main reason for the damage to the tanks. Urbanization was the next reason indicated by the modernized group of respondents belonged to System category. They stated that Encroachment (9.5 percent) and Siltation/Choking (2.4 percent) were also the reasons for the damage. 26.3 percent of the non-modernized group of respondents and 23.7 percent of them respectively had revealed the same reasons causing damage to their tanks.

In the modernized non – system Category, Siltation/Choking was the main reason stated by the respondents (47.5 percent) whereas Construction of road (52.2 percent) was the major reason stated by the Non-modernized non system group of respondents.

TABLE -3: KENDALLS COEFFICIENT OF CONCORDANCE FOR THE MOBILIZATION OF FUNDS

Mobilization of Funds	Type of Tank					Table Total	
	System		Group Total	Non-system			Group Total
	Modernised	Non-Modernised		Modernised	Non-Modernised		
Govt Assistance	4.86	4.92	4.89	4.05	3.85	3.96	4.29
Membership	1.10	1.08	1.09	2.03	2.87	2.41	1.94
Water Less	1.90	2.00	1.95	1.53	2.43	1.94	1.94
Assistance from NGO	3.40	3.08	3.25	3.86	2.66	3.31	3.29
Tree/Fish Resource	3.60	3.92	3.75	3.70	3.34	3.54	3.61
Kendall's W(a)	.920	.924	.916	.523	.114	.260	.425

Looking at the above table it was recognized that there was only moderate level of similarity among the respondents in assigning the ranks to the five items under mobilization of funds.

The Kendall's W varies between as low as 0.114 in the case of Non modernized group of respondents belonged to Non-system category and the maximum of 0.924 in the case of Non-modernized group of respondents belonged to System category.

In the System category, the highest priority was given to Government assistance for both modernized and non modernized groups of respondents recording the mean rank of 4.86 and 4.92 respectively. It shows clearly that still farmers have highly depended on government fund to maintain the tanks. The low priority was given to the membership for these two groups recording the mean rank of 1.10 and 1.08 respectively. Farmers felt that it was very difficult to mobilize funds through membership contribution.

In the Non-system category, the highest priority was given to Watercess for the both modernized and non modernized groups of respondents recording the mean rank of 4.05 and 3.85 respectively. The low priority was given to the membership for these two groups recording the mean rank of 1.53 and 2.43 respectively. The farmers could not give membership subscription to WUA due to economic backwardness.

TABLE-4: CHI-SQUARE ANALYSIS BETWEEN DIFFERENT HYPOTHESES

Hypothesis	Chi-Square Value	Result
System tanks and sluice	11.862	Null Hypothesis is rejected
System tanks and surplus weir	13.132	Null Hypothesis is rejected
System tanks and supply channel	38.224	Null Hypothesis is rejected
System tanks and field channel	.156	Null hypothesis is accepted.
System tanks and irrigation practice	41.923	Null Hypothesis is rejected
Non system tanks and sluice	2.361	Null Hypothesis is accepted
Non system tanks and surplus weir	46.075	Null Hypothesis is rejected
Non- system tanks and supply channel	43.166	Null Hypothesis is accepted
Non system tanks and irrigation practice	60.959	Null Hypothesis is rejected

Note: The table value is 6.635 at 1% level of significance.

V.FINDINGS, SUGGESTIONS AND CONCUSION

5.1. FINDINGS

- In the case of conditions of tank structure, 94.7 percent of the respondents reported that tank in the tank bund was good. In the System category, all the respondents in the modernization group and non modernized group felt the tank bund was good. In the non system category, all the respondents of modernized group and 82.1 percent of the non modernized group were satisfactory with the conditions of the tank bund.
- 25 years back, well water depth at the head reach, mean stood at 19 feet with the SD of 9.16. In the system category, the mean modernized group and the non modernized group stood at 11.91 feet and 12.77 feet respectively. In the non system category, the mean modernized group and the non modernized group was 13.50 feet and 29.06 feet respectively. It is clearly shows that well water depleted year by year due to poor maintenance in non modernized tank farmers.
- Majority of the respondents (55.5 percent) were highly satisfied with the equity of sharing water. 11.5 percent of them and 13.7 percent of them were dissatisfied and highly dissatisfied respectively in this regard.
- Though 60.8 percent opined that tank revenue has been properly spent, the rest of them did not have this same opinion. They indicated that the tank revenue has been spent for religious purposes (29.1) and for the both tank maintenance and religious purposes (10.1)
- Loss of water was the primary reasons for poor maintenance in the tank irrespective of the group of respondents belonged to the system category
- In the non system category, the primary reason was mentioned by the modernized group of respondents (3.86) to the excessive use of water at field and by the non modernized group of respondents to the inadequate maintenance (3.72)

5.2. SUGGESTIONS

- Tank themselves can generate more resources for maintenance. The present practices do not seem to be exploiting the full potential of tank resources. Individual membership contribution from farmers is so poor due to economic backwardness. The right to augment the revenue from tank sources should be given to Water User's Associations. Such a measure would strengthen the local village tank water users own fund for maintaining tanks.
- Disappearance of the supply Channel is very common due to urbanization, population explosions, encroachment by common man in catchment area. The blocking or damaging supply channel sources results in to poor storage of water in the tank even though the rainfall is normal. More WUA's(Water Users Association) should be established to educate farmers in view of importance of tank irrigation maintenance. Many farmers associations are established only on paper. WUA's should function in an efficient and democratic manner.
- The tail end farmers often have problems in receiving water especially in years of low rainfall and poor storage. At such times, the problems of equitable distribution of water between the source and tail end farmers worsen. This can be avoided by modernizing tank with farmers participation.
- The economic analysis shows that irrigation contributes to increase in yields and net income due to modernization. So, Government should initiate more tank rehabilitation programmes through PWD, Agriculture Department, Agricultural Engineering Department and NGO's by involving farmers in designing, planning, execution and sustained maintenance.

- WUA's cannot function without government support. So tanks should not be parted away from the government for any reasons. The misuse of tanks such as construction of government building instead of tanks should be stopped. Stringent law should be enacted to safeguard tanks from encroachment and decay.
- The general awareness on tank ecosystems needs to be build up at all levels. The young children and youth should be facilitated to play an important role by properly motivating them to care for tank ecosystems. Appropriate environmental programmes and promotional efforts to involve various segment of the society needs to be operationalized.
- Compare with system and non system tank farmers, the non system tank farmers do not get adequate water as they depend on their own catchment area. Government should initiate more modernized schemes for non system tank farmers. Socio economically poor farmers own the land in tail end areas they belong to lower caste.
- Community wells should be installed in the tank water spread area to provide little supplementary irrigation for non well farmers during critical periods. Tank and its structures is an asset. It should be protected for our future generations.

5.3. CONCLUSION

In this study, it is clearly shows that well water depleted year by year due to poor maintenance in non modernized tank farmers. In this present study, it clearly shows almost all respondents highly preferred clearing of supply channel. Once the supply channel is damaged, tanks could not get water. Highest source of revenue was preferred by the respondents to the cutting tree irrespective of the group of respondents. It is clearly seen that modernized programme has helped to augment more water resources by practicing effective water management programme with the help of water users associations.

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