



## Research Article

# DOCUMENTATION OF CURTAILING ISSUES IN ADOPTION OF RECOMMENDED WATER MANAGEMENT MEASURES IN MAJOR FARMING SYSTEMS OF TAMIL NADU

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**Abstract:** The Irrigation water management measures are various technologies and practices developed for specific crops pertaining to different farming systems. These measures are developed and disseminated after cautious research to farmers through nodal institutions in Tamil Nadu. Even though the state is extensively concentrating on adoption and dissemination of water management measures through various schemes. Still the concern for judicious use of irrigation water cannot be seen among the users of the state, creating a threat to future availability of water resource. In This Paper, the curtailing issues (constraints) perceived by the users as well as the stakeholders has been documented. The present study is conducted in four districts of Tamilnadu state (Thiruvavur, Sivagangai, Villupuram and Thoothukudi) intensively covering the major farming systems of the state. A total of 278 respondents were interviewed which comprises of 120 wetland paddy growing farmers, 60 garden land sugarcane growing farmers, 60 rain-fed pulses growing farmers along with 38 stakeholders. The basic instrument used for the study was the pre- designed and pre-tested interview schedule. The study categorically revealed that Inadequate water supply during the cropping period, Sub-standard quality of drip materials supplied, Given farm pond specification are not sufficient to retain water for supplementary irrigation and Higher work load coupled with more target and less manpower as the prime constraints in adoption and dissemination of recommended water management measures.

**Keywords:** Constraints, Wetland, Garden-land, Rain-fed, Stakeholders

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## Introduction

Water, the irreplaceable resource available in which all the developmental affairs remains, makes it no doubt for mentioning it as "The elixir of life". The demand for water has increased in a speedy rate that the supply is not sufficient to fill the gap. This scenario pushes the users to look for alternative measures such as water management through saving and conservation. In recent years, Tamil Nadu had been hit with severe water drought condition leaving with only 900m<sup>3</sup>/person/year which classifies the state under severe water scarcity if United Nation (UN) standards are applied [1]. Since, the state is heavily dependent on monsoon rains for its supply it is getting even more complex to manage the water needs due to continuous monsoon failures. Agriculture being the prime consumer of water in the state which uses nearly 75% of available state's water resource. Envisaging for the state's future and working on the slogan "Don't let our Future Dry Up" the state is extensively concentrating on water management for more than a decade now. The state devised various schemes for dissemination of water management measures for the judicious use of irrigation water with the assistance of its nodal agricultural institutions and departments. Still the sustainability of the measures disseminated is under menace due to non-adoption, discontinuance of the recommended water management technologies and practices. Considering these views the current paper discusses on the constraints (curtailing issues) perceived in adoption of recommended water management measures in major farming systems of Tamil Nadu by the users as well as its stakeholders. As this will contribute to formation of strategic suggestions to overcome and strengthen the efforts of the state for water management in agriculture

## Materials and Methods

**Research Design:** Ex-post facto research design was followed for conducting the study. Ray defined ex-post facto research design as "in which the investigator has no scope to alter the independent variables, as they would have occurred prior to the investigation" [2].

**Locale of the study:** The present study is conducted in four districts of Tamilnadu state namely Thiruvavur (Canal irrigated wetland), Sivagangai (Tank irrigated wetland), Villupuram (garden land using lift irrigation) and Thoothukudi (rain-fed land) so as to cover the major farming systems of Tamil Nadu.

**Selection of crop:** The cropped area in each district is calculated from the season and crop report of Tamil Nadu (2015-16), paddy is selected for Thiruvavur and Sivagangai districts., whereas sugarcane and pulses were selected for Villupuram and Thoothukudi respectively based on higher area and selected source of irrigation.

**Methods of sampling:** For the study, a total of 4 blocks, 8 firkas 16 villages *i.e.*, one block in each district, 2 firkas in each block followed by two villages from each firkas were selected based on the higher area on the selected crop.

**Selection of the respondents:** For the study, the respondents have been selected based on proportionate random sampling technique with the data collected from the concerned state departments of agriculture. Farmers were interviewed where in, it included 120 paddy growing wetland farmers, 60 sugarcane growing garden land farmers, and 60 pulses growing rain-fed farmers using proportionate random sampling.

Table-1 Constraints perceived by wetland paddy farmers in adoption of recommended water management measures, (n = 120)

SN	Constraints	Number	Percentage
1	Inadequate water supply during the cropping period	120	100
2	Delay in release of water from the canal	116	96.7
3	Non availability of machineries during peak seasons	70	58.3
4	Inadequate water supply for all the users/farms	94	83.3
5	Lack of technical awareness about water management technologies	102	85
6	Not convinced with recommended practices	86	71.7
7	Improved technologies not suitable for all ecosystems	92	76.7
8	Lack of interest, labour and motivation to perform puddling	100	78.3
9	Lack of concern for silt cleaning and maintenance of water saving structures by govt, officials	112	93.3
10	Lack of concern for diversion of excess water for productive purpose	78	65
11	High investment needed to adopt improved water management technologies	56	47
12	Social loafing by MGNREGA workers in construction of farm pond	98	82
13	Lack of labour for cleaning and maintenance of channels	72	60
14	Non Cooperation among farmers for community efforts of water saving and management	84	70
15	Growth of bushes, weeds in supply channels & tank beds	38	31.7

\*Multiple Responses

Table-2 Constraints perceived by garden land sugarcane farmers in adoption of recommended water management measures, (n = 60)

SN	Constraints	Number	Percentage
1	Difficult procedure/ Too many formalities involved in getting the scheme subsidy/ credit	48	80
2	Inadequate subsidy due to high investment	51	85
3	Sub-standard quality of drip materials supplied	59	98.3
4	Maintenance of the drip system after installation is irksome	46	76.7
5	Not convinced with recommended practices	21	35
6	Difficult to follow fertigation along with drip	18	30
7	Lack of economic support price	41	68.3
8	Inefficient functioning of water user association	39	65
9	Scarcity of labours and high labour cost during peak season	37	61.7
10	Delay in getting subsidy	25	41.7
11	No proper guidance and support from linked drip installation companies	52	86.7
12	Managerial problems due to large scale holdings	17	28.3
13	High cost of water soluble fertilizers	19	31.7
14	Lack of technical support from extension officials after adoption of recommended technologies	32	53.3

\*Multiple Responses

Table-3 Constraints perceived by Rain-fed pulses farmers in adoption of recommended water management measures, (n = 60)

SN	Constraints	Number	Percentage
1	Lack of technical awareness about the water management technologies and practices	38	63.3
2	Non availability of inputs	19	31.7
3	Not profitable after high investment	34	56.7
4	Non availability of technical guidance/experiential knowledge	12	20
5	Non availability of labour	4	6.7
6	Fear of loss due to uncertainty prevailing in agriculture	31	51.7
7	Not convinced with recommended practices	7	11.7
8	Non availability of credit during crucial periods	9	15
9	Farm pond specification given not sufficient to retain water for supplementary irrigation	43	71.7
10	Lack of information and awareness about anti-transparent	39	65
11	Too many formalities in getting the subsidy from govt.	33	55
12	Lack of interest, labour and motivation towards water harvesting	41	68.3
13	Catchment mismanagement (watershed programme by the government)	29	48.3

\*Multiple Responses

Table-4 Constraints perceived by stakeholders in dissemination of recommended water management measures of major farming systems of Tamil Nadu, (n = 38)

SN	Constraints	Number	Percentage
1	Decline of 'kudimaramathu'	26	68.4
2	Poor structures and breakdown of the local authority system	21	55.3
3	Encroachment in supply channel/tank beds by farmers	18	47.4
4	Meager resource allocation and delayed subsidy release	31	81.6
5	Over use/Blocking/theft of water in the head (near sulice) and by the upper catchment farmers	28	73.7
6	Declining multiuser perspective over the year	25	65.8
7	Higher work load coupled with more target and less manpower	33	86.8
8	Poor interface with other stake holders	22	57.9
9	Cumbersome procedural formalities	11	28.9
10	Weak institutional arrangements	10	26.3
11	Growing nexus between castes and politics	20	52.6
12	Growing self-interest and non-cooperation among farmers	17	44.7
13	Inadequate maintenance of budgetary provisions by the government	8	21.1

\*Multiple Responses

Table-5 Overall ranking of perceived constraints in adoption of recommended water management measures

SN	Perceived constraint categories	Average percentage	Overall percentage contribution	Rank
1	Constraints perceived by wetland paddy farmers in adoption	73.3	32	I
2	Constraints perceived by garden land sugarcane farmers in adoption	60.1	26	II
3	Constraints perceived by rain-fed pulses growing farmers in adoption	43.5	23	IV
4	Constraints perceived by other stakeholders farmers in diffusion	54.6	19	III

Also 38 respondents were also chosen separately representing other stakeholder groups through random and snowball sampling, who one or the other way involved themselves in dissemination of water management technologies and practices.

**Tools and techniques of data collection:** The basic instrument used for the study was the pre- designed and pre-tested interview schedule. The questions were related to different constraints faced by the farmers while adopting recommended water management measures. In addition the other stakeholders (viz, agricultural department officials, Pubic works department, watershed management officials, water management training institutes, etc.) were probed for constraints faced by them in disseminating the recommended water management measures. The data was analyzed with standard statistical methods like frequency, percentage and ranking to draw the results.

## Results and Discussions

The constraints perceived in adoption of recommended water management measures in major farming systems of Tamil Nadu are discussed in two perspectives: among farmers of major farming systems in adoption and among stakeholders in respect to diffusion. The study reveals [Table-1] the constraints related to adoption of recommended water management measures by wetland farmers, followed by [Table-2] constraints related to adoption of recommended water management measures by garden-land sugarcane farmers, followed by [Table-3] constraints related to adoption of recommended water management measures by rain-fed pulses growing farmers. The stakeholder related constraints experienced in dissemination of recommended water management are given in [Table-4]. From [Table-1] it could be observed that inadequate water supply during the cropping period as the major constraint faced by cent percent farmers, followed by delay in release of water from the canal (96.6%). Lack of concern for silt cleaning and maintenance of water saving structures by govt, officials (93.33%), Lack of technical awareness about water management technologies (85%), and Inadequate water supply for all the users/farms (83.33%) which further followed with respective descending percentages. Further reporting of Social loafing by MGNREGA workers in construction of farm pond (82%), Lack of interest, labour and motivation to perform puddling (78.33%), Improved technologies not suitable for all ecosystems (76.67%), Not convinced with recommended practices (71.67%), Non Cooperation among farmers for community efforts of water saving and management (70%) Lack of concern for diversion of excess water for productive purpose (65%), Lack of labour for cleaning and maintenance of channels (60%), Non availability of machineries during peak seasons (58.33%), High investment needed to adopt improved water management technologies (47%), Growth of bushes, weeds in supply channels & tank beds (31.67%) as the perceived constraints can be seen from the above table. Some of the results are also reported by Dipak [2]. It could be seen from [Table-2] farmers expressed that Sub-standard quality of drip materials supplied (98.3%) as the foremost constraint, followed by No proper guidance and support from linked drip installation companies (86.7 %), Inadequate subsidy due to high investment (85%), Difficult procedure/ Too many formalities involved in getting the scheme subsidy/ credit (80%), Maintenance of the drip system after installation is irksome (76.7 %), Lack of economic support price (68.3%), Inefficient functioning of water user association (65%), Scarcity of labours and high labour cost during peak season (61.7 %), Lack of technical support from extension officials after adoption of recommended technologies (53.3%), Delay in getting subsidy (41.7) Not convinced with recommended practices (35%), High cost of water soluble fertilizers (31.7%), Difficult to follow fertigation along with drip (30%) and the rest (28.3%) expressed Managerial problems due to large scale holdings. The findings are more similar to the study results of Ramalakshmi [5]. From the above [Table-

3], it could be inferred that 'Farm pond specification given not sufficient to retain water for supplementary irrigation' (71.7%) was the topmost constraint faced by the rain fed pulse growing farmers. This constraint has led to Lack of interest, labour and motivation towards water harvesting (68.03%). Lack of information and awareness about anti-transpirants (65%), Lack of technical awareness about the water management technologies and practices (63.3%) were the awareness related constraints in adoption of recommended water management measures reported by the rain- fed farmers. More than half of the (56.7%) respondents expressed the Non-profitability quotient even after high investment, This was followed by other constraint namely Too many formalities in getting the subsidy from govt.(55%), Fear of loss due to uncertainty prevailing in agriculture .(51.7%), Catchment mismanagement (48.3%), Non availability of inputs (31.7%), Non availability of technical guidance/experiential knowledge (20%), Non availability of credit during crucial periods (15%), Not convinced with recommended practices (11.7%), Non availability of labour (6.7%). These results are inline with Kulshrestha [3]. [Table-4] reveals that higher work load coupled with more target and less manpower was the prime constraints felt by majority of the stakeholders (86.8%). The next important problem expressed by the stakeholders was meager resource allocation and delayed subsidy release (81.6%). Upon observation, it could be seen that the farmers were highly dissatisfied about the inadequate and delayed financial support received from the govt. The other constraints which were encountered and expressed by the stakeholders were Over use/Blocking/theft of water in the head (near sulice) and by the upper catchment farmers, Decline of 'kudimaramathu' (68.4%), Declining multiuser perspective over the year (65.8%), Poor interface with other stake holders (57.9%), Poor interface with other stake holders (57.9%), Poor structures and breakdown of the local authority system (55.3%), Growing nexus between castes and politics (52.6%), Encroachment in supply channel/tank beds by farmers (47.4%), Growing self-interest and non-cooperation among farmers (44.7%), Cumbersome procedural formalities (28.9%), Weak institutional arrangements (26.3%), Inadequate maintenance of budgetary provisions by the government (21.1%). The results are in agreement with the findings of Naidu [4].

The overall ranking of constraints [Table-5] revealed that problems perceived by wetland paddy farmers are higher and ranked first (73.3%). In the constraints reported by the wetland farmers [Table-1] we could sense the farmers' culpability on the government, where they were not much aware of the water's futuristic challenges which could affect the agricultural scenario, further they could not realize water as a public entity which should be shared equally for the resource to be managed. This might be the reason for wetland farmers being reported with higher constraints in adoption of water management, as water is being released to them in the available season unlike the rain-fed farmers who are really hit by the nature's misfortune of monsoon failures. Followed by the constraints of garden land sugarcane farmers (60.1%), here the actual problem is that the farmers are growing cash crop with consistent higher revenues. Some using the excess revenue to extract the groundwater, by installing newer borewell lines often for a same field, without much realization of water as a public article to be used judiciously. This leads to dropping of water table drastically in the district leaving drying up of wells in many nearby low-lying farm areas. These might be the reasons for arising constraints and being ranked second highest for the garden-land sugarcane farmers in adoption of the recommended water management measures. Next [Table-5] 54.6 per cent the constraints perceived by stakeholders is ranked third this is mainly due to the lack of manpower with higher work load and a poor interface among the stakeholders have created a tedious and cumbersome diffusion process of the recommended water management measures coupled with negligence of farmers towards the technologies disseminated. Followed by the constraints of rain-fed farmers (43.5%), where the farmers have experienced a shortfall in the specification given for farm pond construction as its

not sufficient to retain the water, further a lack of technical knowledge about the technologies for non-adoption has been reported. Moreover the prime reason for lowest ranking of the perceived constraints by the rain-fed farmers might be the growing concern among farmers to save and conserve water as they have seen the worst water crisis for the past few years in the district. Lastly realization for the judicious use of water and adoption of water management measures might have been the reason for comparatively lower perceived constraints.

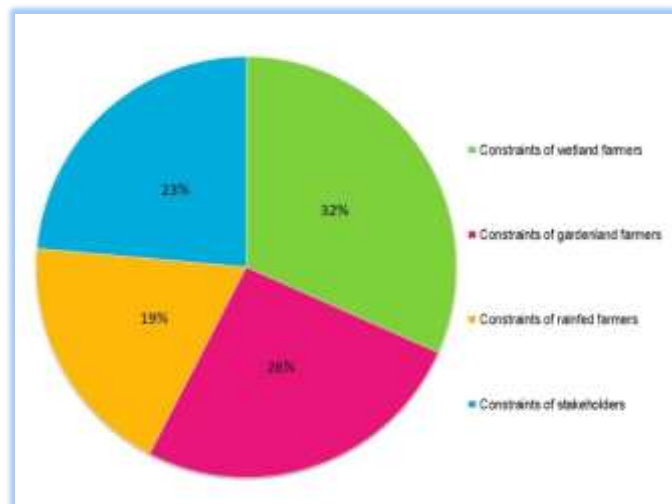


Fig-1 Overall percentage contribution of perceived constraints in adoption and dissemination of recommended water management measures

### Conclusion

The study categorically revealed that Inadequate water supply during the cropping period, Sub-standard quality of drip materials supplied, Farm pond specification given not sufficient to retain water for supplementary irrigation and Higher work load coupled with more target and less manpower by the wetland, gardenland, rain-fed farmers and stakeholders respectively as their prime constraints. As the irrigation water management reaps in a non-monetary benefit, that too on a long run unlike other nutrient management, pest management, fertilizer management, farmers are less motivated and concerned about the forthcoming issues on the water resource. While this implies that there is a dire requisite to draw suitable strategies at grassroots and government level to remove these tailbacks faced by major farming systems of Tamil Nadu in adoption of recommended water management measures.

**Application of research:** This study could help drawing suitable strategies in reorientation of the present schemes for better adoption of recommended water management measures. It could also help in the efficient planning of water management policies and schemes in the future.

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