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HOUSEHOLD WATER SECURITY IN THE STATE OF TAMIL NADU, INDIA: A CASE STUDY

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Abstract - Water Security is "Reliable availability of an acceptable quantity and quality of water for health, livelihoods and production, coupled with an acceptable level of water-related risks". Sustainable development will not be achieved without a water secure world. Providing safe and adequate drinking water to the burgeoning population continue to be one of the major challenging tasks and most countries in the developing world face a daunting task in their attempts to provide effective and equitable public services. Domestic and agricultural water security for the future will always depend on population stability, sustainability in economic and social development, and integrated water resources management (IWRM) strategies. The present study attempts to address the inter-district disparities in water security for domestic uses at village level in the State of Tamil Nadu using Socio-economic data. A detailed field survey was carried out in which almost 300 persons were involved using Participatory Rural Appraisal (PRA) tool. Results suggest that the people in the area are shifting from agriculture due to water security. As it was observed that the area is facing severe problems because of changes in precipitation patterns. The government in the said area is more concerned toward the supply and management of drinking water only. There is a need for sustainability of water resources for agricultural practices as most of the people depend directly for their livelihood on agriculture.

Keywords- Climate Change; Precipitation; PRA Household Water security; Rural water supply.

I. Introduction

Due to the regional disparities in terms of Income, Employment, Health, Education and Gender attainments, Tamil Nadu state has formulated a scheme "State Balanced Growth Fund" to address the inter-district and intra-district disparities.The State using five indicators namely Poverty, (PV), Industrially Backward (IBB), Educational Backwardness (EBB), Drought (DPAP) and Health has identified 105 blocks out of 385 as backward blocks wherein water scarcity is a main problem to meet the ever increasing demand for domestic and irrigation. With this background, the State Planning Commission has initiated a project to study on water security at household level inTiruchirappalli and Tiruppur Districts. The main objective of this investigation is to find out the source sustainability, amount of water used for various domestic activities, constraints faced in obtaining adequate domestic water supply and their reaction to providing piped water supply.The study was carried out for a period of 6 months in 2014-15. This paper describes briefly the study area, the methodology adopted for data collection, analysis of data, discussion of results and conclusions arrived at based on household response.

II. Study Area

The index map shows the different Districts within the state of TamilNadu, the two Districts selected for the study, Different blocks within the two Districts, the two blocks selected for the study, Different Panchayat Unions within the two blocks and Habitations (Villages) selected for the study.

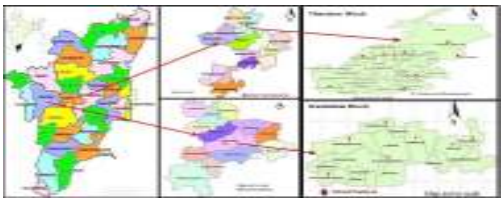

Fig. 1 Index Map of the Study Area

III. Methodology

The step wise procedure followed in this study is given in the form of a flowchart as given below:

Fig. 2 Flow chart showing methodology

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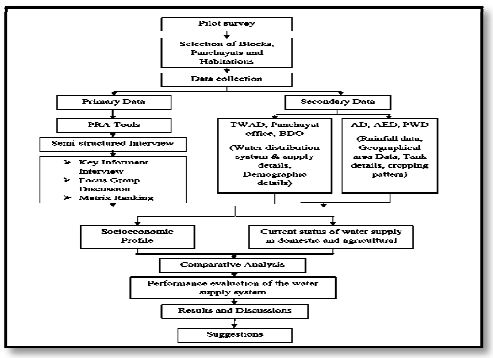


(TWAD- TamilNadu Water and Drainage Board, BDO- Block Development Office, AD- Agricultural Department, AED- Agricultural Engineering Department, PWD- Public Work Department).

IV. Socio-Economic Profile of the Two Blocks

In the two blocks surveyed,the mean number of persons per household is three for Kundadam block while it is four for Thuraiyur block. The sex ratio of ThuraiyurandKundadam blocks is respectively 1.09 and 0.86 with low sex ratio in Kundadam block due to high opportunity provided for women in knitting and dying industries lying in and aroundThirppur resulting in migration. Elderly people (> 50 years) are more in Kundadam compared to Thuraiyur block. Educationally, Kundadam lags behind Thuraiyur.Thenumbe of illiterate in Kundadam is 30 % while is only 20 % in Thuraiyur. Both primary and collegiate education is high in Thuraiyur. Sixty nine percent of household in kundadam in is involved in agriculture while in Thuraiyur, only 49 % is involved in agriculture. Only 12 % is landless in Kundadam while 37 % is landless in Thuraiyur. The average land holding per household is 2 acres in Kundadam while it is only 1.5 acres in Thuraiyur.

Cholam (maize) (34 %), coconut (29 %), onion (22v %) and tomato (16 %)are the major crops in Kundadam while cholam (37 %), cotton (16 %) and gingelly (4 %) are the major crops with 34 & area left fallow for want of water in Thuraiyur. Dairying is a major occupation in Kundadm block with 90 % of householdshvingmilch animals as against 43 % in Thuraiyur. The average agricultural income in Kundadam block (Rs 28,595/annum) is higher compared to Thuraiyur block (Rs 20019/annum) mainly due to higher dairying activities in Kundadam block. The average expenditure per annum in Kundadam block is Rs 16,568 compared to Rs 19382 in Thuraiyur block. These figures indicate that Kundadam's block saving is much higher compared to almost nil saving in Thuraiyur block.

Table I presents the blockwise percent of households using domestic water from different sources. Nearly 99 % of the households use overhead tank (OHT) while only 1 % uses community well in Kundadam block whereas in Thuraiyur block 73 % uses OHT, 15 % hand pumps and the rest uses both OHT and hand pump. In addition to these sources, Thuraiyur gets Cauvery piped water supply while Kundadam gets both Cauvery and Amaravathy piped water supplies albeit their supply is sporadic and not consistent. With regard to water fetching from the source, both in Kundadam and Thuraiyur blocks, the main person is the mother of the family. All others like father, son, daughter-in-law help her as and when she is engaged otherwise and / or not able to do the work by herself. The distance to be traveled to fetch water for 95 % of households is less than 1 km in bothKundadam and Thuraiyur blocks while only 5 % of households travel more than I to 2 km to fetch water. In kundadam, 99 % of households spent less than 1 hour to fetch water from source while only one percent spent 1 to 2 hours. In Thuraiyur, 48 % has to spend less than 1 hour, 44 % has to spend 1 to 2 hours and the rest spent more than 2 hours but less than 4 hours. With regard to means of transport, in Kundadam , 100 % of the household fetch water by walk while in Thuraiyur, 79 % by walk, 14 % by bicycle and 13 % by motorbike.

TABLE I. Percent of Sources of domestic water used by household

Sl.No	Sources / Locations	Avg. No of Household Used in %	
		Kundadam (Tiruppur)	Thuraiyur (Trichy)
1	OHT	99%	73%
2	Channel	0%	0%
3	Common Well	1%	0%
4	OHT & Hand Pump	0%	9%
5	OHT & Own Well	0%	1%
6	Hand Pump	0%	15%
7	Own Well	0%	2%

V. Use-wise Classification of Domestic Water

Use-wise classification of domestic water in the two blocks. The average domestic water use in Kundadam block is 87 lpcd where as it is only 72 lpcd in Thuraiyur. The main difference in water usage is only in washing and bathing quantity of water in the two blocks. Kundadam uses more water (28 lpcd) for bathing as against Thuraiyur (18 lpcd). For toilets, Thuraiyur uses more water than Kundadam because Thuraiyur has more percentage of own toilets.

For livestock watering, the major sources are overhead tanks and well water. In Kundadam, 66% uses OHT water,

33% uses well water and only 1% uses river water. In Thuraiyur, 39% uses OHT water and 49% uses well water. In both the block the average water consumed by the livestock per household is 150 liters/day. With regard to types of domestic water storage structures, in Kundadam block nearly 90% of water is stored in plastic bucket and kudams while the rest in plastic bucket and tanks. In Thuraiyur 48% of water is stored in plastic bucket and kudam, 24% in plastic bucket and drums and 21% in plastic tanks.

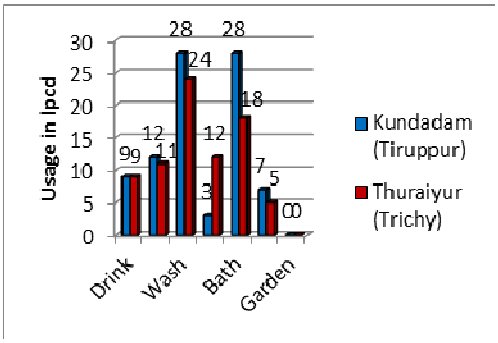
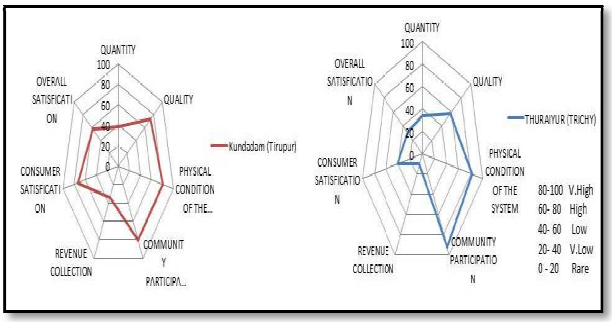


Fig. 3. Use-wise classification of domestic water

The sanitary facilities in Kundadam block are very low. Only 12% of the household surveyed has their own toilets; others practiced open defecation. In Thuraiyur the opposite is true. Ninety four percent of the household surveyed has their own toilet and only 6% practices open defecation. In Kundadam block 64% said that the water quality is good, 22% said it is sour and salty and 14% said that the water is salty at certain times of the year. In Thuraiyur block, 51% said that the water quality is good, 35% said it is sour and salty and 14% said that the water is salty at certain times of the year. In Kundadam only 14% treat the water before consumption while in Thuraiyur 26% treats the water. In Kundadam, out of the 14% treating the water all (100%) uses filtering as the treatment method, where as in Thuraiyur out of 26% treating the water, 30% uses filtering and balance of 70% uses boiling. In Thuraiyur, only 9% of household purchase water for drinking where as in Kundadam none purchase the water for drinking. In Kundadam none is affected by water borne diseases while in Thuraiyur only 9% of the household surveyed is affected by water borne diseases. In winter, they are affected by diarrhea and fever while in summer they are affected by small pox. In Kundadam block none is involved in constructing rainwater harvesting structure while in Thuraiyur block only 9% of the household surveyed involved in rainwater harvesting. Most of the constructions are primarily due to Chief Minister's scheme (AMMA scheme).

VI. A Comparative Evaluation of Water Supply Schemes in the Two Blocks



Comparative evaluations of water supply schemes in the two districtscomparative analysis of the performance evaluation of the water supply systems in Tiruppur and Trichy Districts. The performance of the water supply systems is evaluated under the following seven parameters:

1. Water quantity,
2. Water quality,
3. Physical condition of the system,
4. Community participation,
5. Revenue collection,
6. Consumer satisfaction and
7. Overall performance.

Each parameter is evaluated on a five scale with scores ranging from 10 to 100, with the lowest score (0-20) indicating the worst performance and highest score (80-100) representing the best performance. The scores were calculated based upon the response given by the households. The results presented herein are based on the average of theresponses given by 300 households in the two blocks. The average scores obtained for each one of the parameters in the two blocks are given in Table II. From the table, the worst performing parameter is revenue collection while the best performing score is for physical condition of the system. A score of less than 60 in the overall performance indicates that the performance of the water supply system in the two blocks is below satisfactory, although the overall performance score in Kundadam Block is 58 indicating that the water supply system in the Kundadam block performs better than the Thuraiyur block.

TABLE II.Average scores of performance evaluation

Particulars/ Name of the Block	Thuraiyur (Trichy)	Kundadam (Tiruppur)
Quantity	34	38
Quality	58	73

Physical Condition of the System	**82**	**81**
Community Participation	92	81
Revenue Collection	**10**	**34**
Consumer Satisfaction	41	73
overall Satisfaction	**31**	**58**

VII. Conclusion

Presently the rural water supply schemes are operated with pumbing from the sources and filling overhead tank and then distributing the water from the overhead tanks. This results in pipe burst, inequitable supply among the village community and head tail inequity. The predominant section of the village community with whom we discussed, would like to get the water supply from the source to an underground sump and from there the water has to be pumped to storage tanks such as Sintax Tank and located at critical points. By this arrangement, the inequity exists now can be considerably reduced now.

During acute water scarcity, we need to develop contingency plan to meet the crisis. One is the utmost care and frugal use of fresh water for drinking and cooking. Second is the transport of water from outside the habitation which is going to be difficult (because every other area is also suffering from acute drought) and costly. The third alternative is to desalinize the salty ground water through reverse osmosis process which can be supplied to clusters of hamlets depending on their needs. By this, we may be able to provide cheap treated water at considerably low, subsidized price. Such an emergency supply must be entrusted to a private contractor who can execute the job as per agreed TOR. It will be difficult for the Panchayat to undertake this type of work to meet the pressing need of the community.

Massive awareness programme has to be carried out at habitation level as to how to store drinking water safely and use it for consumption. This kind of awareness must be given also at schools through training of teachers, Anganwadi officials, VAO and Panchayat clerk.

With sufficient grey water available now through the use of combined water supply systems, it is suggested that awareness has to be created among households (women) as to, how to treat the grey water and use it for kitchen garden. Recently, use of grey water treatment and itsuse is becoming popular among rural communities.

A number of aspects are to be looked into from service providers of rural water supply.The TWAD board has to look into the design practice of rural water supply based either on domestic consumption or livelihood requirement, protocol for application of disinfection, construction practice of drainage and drinking water supply infrastructure and the rules and regulations for operating the rural water supply system, especially below the OHT and at habitation level.

The weakest link in the whole of RWSS is its management and distribution of water supply from OHT which at present appears to be in disarray and not functioning well under Panchayat management. Extensive training is needed to the last tier workers and officials with appropriate financing.

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