CHAPTER – III

METHODOLOGY

Introduction

Participation is now the buzzword that makes any project successful. Despite huge investments made by successive governments and a host of other organizations in the water resources sector, the unsatisfactory water distribution and inefficient management of the system, which contributed to the declining economic and social rate of return was largely attributed to the lack of participation of the users in this sector. Here an attempt is made by the researcher to find out the participation of the community (water users) in water management.

Statement of the problem

Before independence, the state and central governments in India have made large investments in construction of government-operated irrigation systems. Numerous studies have shown that these systems have performed poorly in terms of irrigating the planned commands, system maintenance, water distribution, equity and efficiency in water usage and recovery of water charges.
Also, increased pressure on government finances has resulted in irrigation system deterioration further as less and less resources are devoted to system maintenance.

In an effort to solve these problems, several states in India with encouragement from the centre, are considering or implementing programmes to transfer some irrigation system management responsibilities from the government irrigation agencies to Water User Associations (WUAs). Numerous other countries are also trying this approach as well.

It is expected that management transfer will have three beneficial results. First, crop production will increase, because the farmers collectively can make more effective water distribution decisions. Second, because they are directly affected, farmers are likely to take better care of their systems than the government officials, thus improving sustainability of the systems. Third, management transfer will result both in reduction of staff and other government costs for irrigation system management, thus easing pressures on government exchequers. With that objective, the
Tamil Nadu Government has passed the Tamil Nadu Farmers’ Management Irrigation Act 2000.

In a walk-through survey of the researcher, it is found that the WUAs can effectively function as a gross-root institution for politico-cum-socio economic development. It could help in the development of local leadership and organizational abilities. It assures close contact with the Government as well as people. The WUAs can effectively act as guardians of common property and natural resources.

In the mean time, it is also found that local family and caste dissidence reflects on the smooth sailing of WUAs. Further, there is bureaucratic apathy to delegate power and authority. Political aberration is another threat. It is also doubtful whether the WUAs adequately represent the weaker sections of the society. As such, a micro study of an area on Institutions in Irrigation Management in the selected area will be rewarding.

**Selection of the Area of Study**

The area chosen for this micro study is Thovalai and Agastheeswaram Taluks of Kanyakumari District.
Kanyakumari District forms a part of Tamil Nadu. The annual average rainfall of Tamil Nadu is about 925 mm. compared to India’s average of 1250mm. The total rainfall over the state is about 12MHM per year. Sivanappan (2001), in one of his articles, enumerates the supply of and demand for water resources in the state as follows.

**Table 3.1 Supply and Demand for Water : Tamil Nadu**

<table>
<thead>
<tr>
<th>Potential Supply</th>
<th>Total Water Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface water 2.33 MHM</td>
<td>Irrigation needs 5.00 MHM</td>
</tr>
<tr>
<td>Ground Water 2.64 MHM</td>
<td>Industry 1.38 MHM</td>
</tr>
<tr>
<td>Total 4.97 MHM</td>
<td>Population needs 0.37 MHM</td>
</tr>
<tr>
<td>(rounded off to 5.00 MHM)</td>
<td>Livestock 0.10 MHM</td>
</tr>
<tr>
<td>Imports from other states 0.75 MHM</td>
<td>Other needs 0.15 MHM</td>
</tr>
<tr>
<td>Total 5.75 MHM</td>
<td>For recreation et cetera 0.25 MHM</td>
</tr>
<tr>
<td>Total 7.25 MHM</td>
<td></td>
</tr>
</tbody>
</table>

Sources: District Collectorate, Kanyakumari.

Thus, there is a supply – demand gap of 1.50 MHM (or 550/600 TMC). Actually, Tamil Nadu is a water deficit state. The gross irrigated area of 3.6 to 3.8MHA. in 1970’s was reduced in 90’s and the average is only 3.40MHA or so. The area under irrigation is only about 45 percent of the cultivated area for many
years. The storage capacity to hold the surface runoff is good in Tamil Nadu. The existing capacity of reservoirs and tanks is about 430 TMC., that is, 40 percent of the surface flow can be stored in these storage structures. As such, the surface water which goes to the sea is very minimum in the state. The state has all the three sources of irrigation- canals, tanks and wells. During 1997-98, their relative share in the total net area irrigated was of the order of 28.5, 22.9 and 48 percent respectively.

Kanyakumari district, the southern most district in Tamil Nadu, is one of the districts that nature has abundantly blessed. Guarded on three sides by the Arabian Sea, the Indian Ocean and the Bay of Bengal, the Western Ghats and Tirunelveli district forming the eastern side, and bounded by Kerala state in the west, this district which has an area of 16840 sq.km. is located between eight degree two minutes and eight degree thirty two minutes north latitude and seventy seven degree and six minutes and seventy seven degree thirty five minutes east longitude. The topography just slopes (10to60percent) towards the west, creating three physical divisions- a mountain region that occupies 45.82 percent, the low lands that covers 29.07 percent and the mid land that covers 24.11
percent of the total area of the district. The distance between the mountain and the sea is, on an average, about 40kms. This means that the rain water that flows from the highlands should be checked on the way, stored over time and released at time, in order to prevent them from entering quickly the sea. As such, the physical features themselves dictate some sort of water management in this district.

The district has an average rainfall of 1456.8mm. The district is distinct in the state as it receives rains from both the South – West (June-August) and North –East (October - December) monsoons. The rainfall is usually more during the North-East monsoon. The demand and supply position of water in the district can be enumerated in this way.

Potential Supply: Surface runoff in the district was put at 0.028MHM by Kamaraswamy in 1974, assuming 1720 mm. as the normal rainfall. However, the normal rainfall at present is only 1456.8mm. So, assuming other things, as rainfall coefficient (0.50) normal surface runoff (0.08MHM) and utility coefficient (0.35) remaining the same, the surface runoff in the district could be only
0.0237 (rounded off to 0.024) MHM. The same source puts the ground water potential at 0.0660 MHM. This estimate is also on the higher side, as the State Ground Water Department puts it at only 0.0204 MHM.³

Thus the total water potential of the district is – 0.024 MHM + 0.0204 MHM – 0.0444 MHM. Turning to the demand for water, the gross irrigated area is 44957 ha. (say, 45000 ha). Taking into account the dominance of paddy crop, Sivanappan,⁴ decides that 0.851 HM per cropped hectare will be the appropriate demand for irrigation measure. On that basis, irrigation demand – 45000 x 0.85 – 0.038 MHM. Turning to population demand (for drinking water), an estimate puts it at 12.725 million litres per day at the daily requirement of 70 litres per day per person.⁵ This amounts to 0.0046 MHM. Taking livestock demand at 0.0001 MHM per head of population, it will come to 0.0015 MHM. The need for other purposes may be put at 0.0001 MHM.
Table 3.2  Supply and Demand for Water: Kanyakumari District

<table>
<thead>
<tr>
<th>Potential Water Supply</th>
<th>Total Water Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface water</td>
<td>0.0237 MHM</td>
</tr>
<tr>
<td>(rounded off to)</td>
<td>0.0240 MHM</td>
</tr>
<tr>
<td>Ground Water</td>
<td>0.0204 MHM</td>
</tr>
<tr>
<td>Total</td>
<td>0.0444 MHM</td>
</tr>
<tr>
<td>Irrigation needs</td>
<td>0.038 MHM</td>
</tr>
<tr>
<td>Population needs</td>
<td>0.0046 MHM</td>
</tr>
<tr>
<td>Livestock</td>
<td>0.0015 MHM</td>
</tr>
<tr>
<td>Other needs</td>
<td>0.0001 MHM</td>
</tr>
<tr>
<td>Total</td>
<td>0.0442 MHM</td>
</tr>
</tbody>
</table>

Sources: District Collectorate, Kanyakumari.

Thus, the total demand =

\[0.038 + 0.0046 + 0.0015 + 0.0001 = 0.0442\text{MHM}\]

Besides, there is the industrial demand. It has to be mentioned in this context that there is a committed demand to supply 1.0m.cum. to Indian Rare Earths Ltd, 2060 cum. to Kanyakumari Rubber factory, Kaliyal, 3500 cum. to Government Rubber factory Perunchani and 89 m. cum. to Koodankulam Atomic Power Project (total 0.000090MHM). The district enjoys a right over imports from Neyyar dam situated in Kerala state (an inter-state project). The Kanyakumari branch channels of the dam make available normally 152 cusecs at Kollencode head works for the ayacut at Vilavancode taluk (Tamil Nadu). Of the localized command of 2347 hectare,
these imports assure irrigation only to 1457 hectares, once again, there is a shortfall (890 ha.)

Under these conditions of a precarious water balance, (of about 0.0002MHM) the need to conserve the water resources is self evident.

The unreliable and fluctuating potentiate of the monsoons on its part, also, emphasizes the need to store and release water over time. In recent years, the actual quantum of rainfall, seldom reaches the average level. Over a period of twelve years (between 1985 and 1996) the actual (1629 mm) exceeded the average only in one year in 1991; in all other years it was less than the average., ranging between 782.8 mm. (in 1986) and 1283.1 mm(in 1991). Further, there is a regional variation in the distribution of rainfall; the rainfall is generally very high (2000mm.) in the northern parts of the district and considerably low (800-900mm) in the south. Thus, nature as a whole dictates some sort of water management in the district. Many land features like topography, water table, drainage and soil factors determine the irrigatability of a region. Under the land irrigatability classification, 81.87 percent of the
total area of the district has moderate soil limitation for sustained use under irrigation, 17.25 percent has severe limitation and only 0.88 percent has marginal limitation.\(^7\)

The district has all the three sources of irrigation – canals, tanks and wells and their relative share in the net irrigated area (1998-99) was 39.4, 58.5 and 2.1 percentages respectively, which is basically divergent from the state pattern. Tanks which are the most important source in the state are quite insignificant in the district. The proportion of the area under irrigation in the cultivated area is also less (35.6 percent) than that in the state (45 percent). These mean that the district is to be focused from a different angle.

A review of the development and management of water resources of Kanyakumari district in particular is relevant on another ground also. Before independence, the district was part of a princely state (Travancore). After that, for nine years, it was in Travancore-Cochin state. In 1956, it was merged with Tamil Nadu. As such, the proposed study provides three different politico-administrative backgrounds for analyzing the state-sponsored programmes of irrigation over time.
So far as people’s involvement in irrigation is concerned, Puravu- the traditional community organization of the water-users- has a long history in this area. Plans to overlook them were launched once by the Travancore state. The recent schemes of the Tamil Nadu State- Command Area Development Authority and Water Resource Consolidation Project-were also extended to the district, under the auspices of which a number of pasanadar sabhas (water users associations) were also started recently. An intensive study of these sabhas is another fruitful area for investigation.

Relevance of the study

There are already a few research studies on irrigation in Kanyakumari district. Narayana et al (1982) in their study analysed the changes that have much to do with agricultural change, the collective nature of water supply and the individual nature of its use and the consequent conflicts when the ‘use’ deviates from a certain pattern.

Pandian (1985) studied the effects of state intervention in the district on social product over a period in Nanchil Nadu. The
study revealed that the state has enhanced the revenue and reduced the effectiveness of irrigation. Sujatha (1990) has presented a macro study\textsuperscript{11} of the rivers and the irrigation system as such in the district and focused also on the process of commercialization and its impact on the various markets. Sita (1997) in her doctoral thesis\textsuperscript{12} describes the history of each and every dam and canal that were constructed in the district over different periods. Jeyakumar (2002) in his doctoral dissertation,\textsuperscript{13} dilates more about Participatory Irrigation Management (PIM) in other states and the engineering devices for measurement of irrigation water and water distribution systems at branch canals. Sham Shankar in his doctoral dissertation (2004) on Development and Management of Water Resources in Pazhayar Basin in Kanyakumari District – A Study of the Technological, Economic and Institutional Issues, treats exhaustively the issues taken for the study. The present study is different from the earlier ones as its focus is on the sociological issues, in particular.

**Area of Study**

It is proposed to study the problems stated above in the context of the Tanks and Channels in Thovalai and Agasteeswaram
taluks of Kanayakumari District. These two taluks are important areas under cultivation – the so called granary of erstwhile Travancore State. There are one river, two channels, and nearly 600 tanks in this area. Further, Pazhayar, the principal river of the district which has been the seat of all technological, economic and institutional reforms in Kanyakumari districts originates from the north end of Thovalai taluk and merges with the Arabian sea in the southern tip of Agasteeswaram taluk and as such the two taluks are the ideal representatives of Kanyakumari District in matters of water. Again, the very physical make-up of the system itself is unique. The sloping physiography of the area is skillfully employed to augment and conserve water: just below the ghats runs the Thovalai channel; about five miles below it the Nanchil Nadu Puthanar channel and about six miles below it flows the Pazhayar. In between the channels and the river and below the river are other tanks. Thus a study of the two taluks will be the study of an area where technology has run its full course. Another feature of these two taluks in the district is that only here the percentage of SC population is 11.50 percent in Thovalai and 9.9 percent in Agasteeswaram. It should be pointed out that 11.50% is the
highest percentage of SC in the district. This makes the social contexts of the selected area more realistic. The traditional WUAs (Puravus) are functioning here for the last three to four centuries. The state has taken in recent times a number of measures to form Pasana Sabhas in the area. Thus the two taluks are the best fit for the proposed micro study.

**Objectives**

1. To analyse the performance of formal and informal Water Users Associations in the study area.

2. To study the participation and involvement of farmers in the management of Water Users Associations.

3. To appraise the problems faced by the Water Users Associations in the study area.

4. To understand the grievances and disputes that arise in sharing distribution and regulation of water for irrigation.

5. To assess the efficacy of the strategies adopted for redressal of the grievances.
6. To make suggestions for effective functioning of Water Users Associations.

**Hypotheses**

The following hypotheses are to be put to test in the study.

1. Social changes have a definite impact on the institutional set up.

2. The state-sponsored WUAs cannot replace the traditional WUAs.

3. The state-sponsored WUAs presuppose the awareness and involvement of water user.

**Design of the Study**

The proposed study is designed as to give a historical account of the role of the state vis-à-vis the community in the harnessing of water. A description of the role of the local community organization in the up-keep of rivers, channels and tanks and a critical assessment of these local organisations and institutions in water management is to be given. The socio political impact of the
prevailing system of water management on inter-community relationship is enquired into.

The study consists of preparation of schedule, pre-testing, execution, classification, tabulation and analysis of data, interpretation of analysed data and suggestions for future.

The present study is based on both primary and secondary data.

**Collection of primary data**

Primary data are collected with the help of a well-structured Interview Schedule to record the responses of the farmers, institutional heads and PWD officials regarding the multi dimensional aspects of irrigation water management.

**Collection of Secondary Data**

Secondary data are collected from the reports of the State Public Works Department, Agricultural Engineering Department and also from the District Statistics Office.

**Pilot Study**

Prior to the start of the field work, after getting through knowledge of the field and a clear understanding of the nature of
the data required, the investigator prepared the items of interview schedule. The investigator met the respondents in different areas and encouraged them to talk freely about their basic problems. After getting the basic knowledge of the study area, the investigator prepared the items in the interview schedule. A preliminary draft was prepared and submitted to the experts in the field for discussion. After discussion with the experts the interview schedule was modified with correct words and the interview schedule was finalized.

**Sampling**

The study covered a total sample size of 300 respondents. As one of the objectives of the study is to analyse the effectiveness of formal (sabhas) and informal (puravus) institutions, the 300 respondents are distributed equally among the associates of the two institutions. Thus the final distribution of respondents is as follows:

<table>
<thead>
<tr>
<th>Taluk</th>
<th>No. of Sabhas Associates</th>
<th>No. of Puravus Associates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thovalai</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>Agasteeswaram</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>150</strong></td>
<td><strong>150</strong></td>
</tr>
</tbody>
</table>
The sample respondents were identified using purposive sampling technique. In order to make the sample still more representative, the views of some of the office bearers of the traditional Bodies (puravus) and the promoters of the pasana sabhas were obtained with the aid of an additional interview schedule.

**Statistical Tools Used**

Conventional statistical tools such as simple averages and percentage ratios are used for analysis and interpretation purposes. Besides, correlation co-efficient is used to examine the relationship between variables such as family structure and socio-economic status with farmer’s perceptions of system effectiveness.

Insights gained through observation have been incorporated into the text of the report at appropriate places.

**Significance of the study**

This is the first micro study of an ancient and central irrigation system in the district. "The system appears to be in peril. Much depends upon the public awareness to save the irrigation works and the support by the Government of Tamil Nadu to the
irrigation wing of the Public Works Department to undertake maintenance”. The present study

a. brings out not only the level of public awareness of the prevailing system but also the nature of their involvement in it and

b. provides a review of the functioning of the irrigation authorities that could provide a blueprint for further state action.

Limitations of the study

1) The study discusses only the irrigation use of the water resources, the reason being, it is the major use.

2) The study focuses only the surface water potential and ground water management.

Chapterisation

In Chapter I, Introduction, an attempt is made to present the contours of Water Economics and delineate the contents of the proposed study as one of elaborating/assessing the development/management of irrigation.
Chapter II reviews the literature on the subject and attempts to discover the gaps to be filled up by the proposed study.

Chapter III is on the methodology of the study. It discusses the objectives and hypotheses of the study, the data collected, the tools used and also the significance and limitations of the study.

Chapter IV covers the profile of the district and the study area Thovalai and Agasteeswaram Taluks.

Chapter V describes the origin, structure and functioning of the WUAs in the study area.

Chapter VI discusses the responses/reactions of the Respondents over the functioning of the WUAs and its barriers.

Chapter VII presents the findings of the study, the conclusions arrived at, suggestions offered and also guidelines for future studies.
REFERENCES

1. Sivanappan, R.K., Meeting Water and Energy Requirements in Tamil Nadu ‘Kisan World’, June 2001, pp.23-25. According to the Vice-Chancellor, TNAU, in the state, the demand for water was estimated to be 5.22 MHM by 2025, while the supply was likely be only 4.47 MHM – The Hindu July 8, 2002, p.5.


